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USSR Report

MILITARY AFFAIRS

FOREIGN MILITARY REVIEW

No 10, October 1986

SPECIAL NOTICE INSIDE

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SPECIAL NOTICE

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USSR REPORT

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Except where indicated otherwise in the table of contents, the following is a complete translation of the Russian-language monthly journal ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, published in Moscow by the Ministry of Defense.

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MILITARY STRATEGEM

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (signed to press 10 Oct 86) pp 7-13

[Article by Col-Gen V. Lobov; "Military Strategem (According to U.S. and NATO Specialists' Opinions)"]

[Text] Foreign military specialists have always showed great interest in the problem of deception. After the Second World War interest in this problem intensified, especially among the U.S. and the agressive NATO bloc's armed forces leadership. It is well known that military strategem or deception is subterfuge with the goal of misleading the enemy, sending him in the wrong direction, and so forth. Its forms and methods are widely studied and actively developed. They are used in the training process, in armed conflict, and in local wars. The press devotes much attention to this problem.

This is not accidental. The entire history of imperialism is an endless enumeration of wars and armed conflicts throughout all areas of our planet.

"Imperialism," the political report of the Central Committee of the CPSU 27th Party Congress emphasized, "due to its social nature, constantly generates aggression and adventuristic policies." The most refined methods are employed to pressure and influence, both militarily and politically, sovereign states, including those recently liberated from colonialism. The General Secretary of the CPSU, M. S. Gorbachev, noted in his political report to the 27th Party Congress that "Through political maneuvering, promises and bribery, military threats and blackmail, and often even direct interference in internal affairs of liberated countries, capitalism has largely succeeded in retaining the earlier relationships of economic dependence."

One of the certain conditions for achieving success upon the outbreak of war, according to NATO strategists, is deception, interest in which has significantly increased in the 70s and 80s. Problems connected with this category of military art are regularly examined in military conferences and symposia of Western military theoriticians. Evidence of the consistent interest in the problem of deception is the number of special articles on this topic appearing abroad. The author of the book "Instruments of Secrecy," A. Prise, refers to deception as "a basic factor of victory," capable of having decisive influence on the outcome of battles. In his opinion, thanks to

skillful organization of concealment, it is possible to prevent massive losses and achieve surprise.

In the work of B. Valee, "Introduction to Deception, Surprise, and Secrecy in War," there is a definition of the forms and means of strategic and operational deception, and the book by V. Harris, "Employment of Counterdeception on a Strategic Scale," contains an analysis of combat experience from the Second World War, the Korean, Viet Nam, and Arab-Israeli wars. Also, it sums up the results of research on defining the amount of resources necessary to achieve warning in delivering a first strike on the enemy. The authors of various books published abroad describe many uses of deception in operational and strategic scales during World War II as well as methods of hiding Army and Navy strike groups (C. Cruikshank, "Deception in World War II", and others).

In the opinion of foreign specialists, both at the present time and in the future, favorable conditions for successful military operations and victory will be achieved using deception. This has been made possible mostly by the growth of the combat potential of the troops and by raising the level of their combat readiness. They believe that there are now real possibilities for deceiving the enemy by prearranged, large-scale demonstrations and disinformation using various methods and techniques. It is also noted that the opposing side also has effective intelligence and is capable of substantially complicating and even preventing the use of deception. Therefore, it is not accidental that in official NATO directives it is emphasized that every commander should plan the use of measures to prevent enemy intelligence activities.

The influence of deception, in the opinion of foreign specialists, may be neutralized by conducting complex specialized disinformaiton, particularly to distract or spread the attention of his intelligence. For these purposes, such methods as publication in the open press of a large amount of special military information, containing false data mixed with insignificant verifiable information may be used.

Judging by material in the foreign press, the approaches of the majority of Western theoriticians to the question of deception and its role in modern militayr science is characterized by the following.

First, it is looked upon as a complex of measures designed basically to create in the enemy an erroneous conception, or, as a minimum, an uncertainty about the intentions, time and scale of activities. This shows that questions of deception are resolved by NATO strategists mainly concerning offensive activities.

Secondly, deception is used in a majority of cases for achieving surprise, the elements of which are secrecy of operations, use of camouflage, deception, originality, and others. It is believed that secrecy produces deception which in turn makes it possible to take the enemy unawares.

Foreign authors accentuate, in their works, extensive use of deception in the early stages of a war, especially for a first strike. Also, as the foreign

press illustrates, deception is not a component part of the concept of an operation. Measures for its accomplishment usually are included in an annex to the operations plan, for example on achieving surprise in an operation. They are provided for in the appropriate manuals and regulations, etc. Besides, commanders, staffs, and troops should employ variety, estimates of the enemy, and favorable terrain, weather, and time of day.

At the present time, the theoretical military views of the U.S. and NATO leadership support the growing importance of surprise, especially in the initial stage of war. This has been brought about by heightened attention to the conduct of a non-nuclear war and the appearance of new weapons, including precision ones. A prerequisite for the successful conduct of such a war must be, in their opinion, sufficient combat power of their own and their NATO partners as compared to the opposing side, which in their judgement is rationale for further strengthening of adventurism in military art and NATO strategy.

Now that the leadership of the U.S. and NATO has begun to to develop the means to realize the AirLand Battle concept and follow-on force attack, Western military theoreticians, modernizing the views of Clausewitz and Jomini, Ludendorf and Keitel, are trying to find recipes for quick victory. Emphasis is placed on the teachings of Clausewitz, "Surprise is the most important guarantee of victory". Also in the center of their attention are the positions of Molke and Ludendorf relative to conditions at the start of a war. In particular, the importance of a statement of Ludendorf, which considered the outbreak of war and large unneccesary, is emphasized.

Proceeding from that, the leadership of NATO has placed before the staff and troops special demands - find and check out new means of deception and secrecy which will be more effective and will ensure surprise in operations. For example, in deep attack together with the use of aviation, artillery, and special forces, it is recommended also to employ offensive electronic warfare (EW) and deception.

Deception plans and measures are being developed by the supreme commands of NATO armed forces. It is believed that coordination of the actions of all branches f the armed forces and cooperation of the national commands of the bloc countries are necessary.

NATO's military leadership tries to hide the equipment of the European theater, in particular the creation of strategic stores of weapons, fuel, ammunition, rations, as well as troop training and for deployment to areas bordering the socialist countries (which has often occured in the annual exercise AUTUMN FORGE, including the one in 1986), and the carrying out of a number of mobilization measures connected with strengthening the groups of forces targeted against the Warsaw Pact.

Considering the growing capabilities of enemy intelligence in finding regrouping of forces and preparing them for an offensive, NATO military specialists consistently recommend conducting measures to prevent his intelligence activities, warn of surprise attack, and preserve their combat readiness. Force vitality must be ensured, in their opinion, together with

other measures of deception relative to their true intentions, skillful and continuous use of security, frequent changes of positions, secrecy of activities, use of local defensive characteristics, countering enemy EW, and wide use of counterintelligence measures. They plan together, with hiding of identifiers of troops and euqipment, to use as widely as possible disinformation and demonstrations.

During bloc training, diversionary maneuvers are often used to deceive the enemy. An actual landing by a force will be proceeded by other landing demonstrations in other places. As TEAM WORK-80 showed, the American command, together with operational activities, secretly solved the problem of equipping central Norway, to create in that area, stores of weapons and equipment for sending a U.S. marine brigade there in a crisis period.

In official U.S. Army directives, the necessity of conducting security and deception both in the offense and defense is especially emphasized. In them, it is recommended that commands of all levels and staff officers should be personally engaged in organizing activities and employing deceptive measures. They should also be able to evaluate camouflage, security of combat operations, disinformation measures, etc.

The significance of deception under modern conditions is confirmed by experience in local wars in which the attacking side was given a decisive role to conducting a surprise first strike.

During the aggressive war by the U.S. in Viet Nam, the American command planned the demonstration activities and disinformation measures, imitation, and deception in a special directive. Aggressor forces induced units of the National Front for the Liberation of South Viet Nam to leave the safety of their camps and attack one or another American or Saigon units supposedly in a defensive position. But other secretly placed American or Saigon forces attacked the patriots.

Another method that was also used was "direct hit," in which an organization openly moved in various directions and then suddenly changed course, encircling an area and joining battle with the patriotic forces. Having data on the escape routes of the patriots, the American command put special airmobile assaults into those areas.

Use of new combat equipment and forms of combat were also practiced, which were concealed from the patriots by appropriate means. Thus, the preparations and sudden introduction of the riverine forces were secret. Two squadrons were located in the Mekong River delta. With their help, the Americans quickly penetrated deep into the jungle and prevented use of the river by the patriotic forces for attacking the rear area of the American or Saigon forces.

Also, for the first time, airmobile operations were employed, the essence of which was the rapid and secret insertion of infantry and other units into the desired region by helicopters. The aggressors used the Air Cavalry Division, specially created in 1965, against the patriots. After conducting airmobile operations, they planned secret insertion into one zone or another of combat operations of diversionary and reconnaissance groups which, with a five-day

supply of necessities, conducted observation by day and at night lay in ambush. When the patriotic units returned to that zone, these groups attacked them.

Among the tactical methods of deception in combat with an air opponent covering forces was use of air defense organizations as "mobile" and from "ambush." As a rule, highly mobile antiair weapons, capable of firing from the move or a short halt, were used for this purpose. Air defense organizations, secretly changing positions after each firing, moved to new ones located several km from the old ones. Ambush positions were selected considering terrain in the direction of probable enemy attack and, as a rule, for enlarging the coverage zone of the air defense unit. Increasing effectiveness was accomplished by secrecy and enticing units into ambushes manned by antiair systems.

Use of deception in combating air defense during the barbaric attacks on the DRV, American air operated at minimum altitude. Aircraft approached targets on bomb runs at altitudes of 50-100 m at speeds of 700-900 kph, to suddenly appear in the target area and deliver their ordnance in one pass. Attacks from several directions as well as deceptive strikes and maneuvers were also widely practiced.

In action over a target covered by SAMs, deceptive maneuvers were used to confuse them. EW planes were sent into the bombing area actively jamming the acquisition and control radars. Then decoy groups (two-four planes) were sent into the area at medium altitude, which, never entering the zone of the SAMs, left, radically changing course and altitude. At that moment, from different directions at altitudes of 50-100 m, the attack groups approached the target and carried out the attack. This method, as reported in the foreign press, is widely used in NATO during training.

Experience in the Arab-Israeli wars, especially 1967, confirmed the great significance of deception. In foreign specialists' opinion, the Israeli surprise attack, which was achieved through the use of all forms and types of deception, was a decisive success factor.

The Israeli deception was directed toward hiding the preparation of the attack on the Egyptian armed forces and deceiving them. This same goal was pursued in the provocative attack on Syria, carried out by Tel Aviv about a year before unleashing their attack on Egypt. For a month before the attack, the Knesset openly left to the government the authority to conduct war against Syria. On this pretext mobilization was begun and troops were moved toward the Syrian border. Reports started to arrive at various capitals through diplomatic channels that the Israeli government intended a lightning attack on Syria at the end of May, and then a transfer of military activities to Egyptian territory, but the real plan was just the opposite.

To deceive the Egyptians, the Israeli general staff carried out a major demonstration of concentrating a large group of forces in the south, though the main attack was actually prepared in the north.

Secrecy measures were taken. Use of radios for communciations between headquarters and forces during the approach into attack positions and into the offensive was forbidden. All movement of troops toward Arab countries' borders was done only at night, and concentration in assembly areas was carefully concealed. Preparation of Israeli aircraft for the attack was especially carefully concealed. Radio silence was observed on airfields and in the air. Flights of military planes close to Arab borders were forbidden and the radius of flight of reconnaissance planes was limited.

Disinformation, demonstrations, and decoys were widely used: decoy airfields and landing strips were constructed, concentrated forces were imitated, especially tank forces, and ficticious radio transmissions were used. Two days before the start of the aggression, second echelon units gave personnel short term passes. All these measures, in foreign experts' opinion, allowed the Israeli command to hide preparations for the attack and deceive the leaders if Egypt and other Arab countries.

Combat activities, as reported by the Western press, started with an attack by Israeli planes on Egyptian planes on airfields, command posts, air defense radar stations, SAM positions, and bridges over the Suez Canal. Aircraft were launched at precisely calculated times in order to arrive over their targets at the same time. Approach to targets was carried out in total radio silence at minimum altitudes on the Mediterranean side using approaches over the Nile River delta and subsequent independent approach to their targets. These secret activities complicated acquisition of them by air defense radars. Flight paths of Israeli aircraft on both the Mediterranean and Red Sea sides were selected outside SAM coverage. Simultaneously with the first air strike, active radio interference began, which completely paralyzed the air defense radars and ensured concealment of the approaches of Israeli aircraft. Upon launch of Egyptian aircraft, the Israeli disinformers, knowing the enemy frequencies, immediately entered their nets and deceived ground stations and even the aircraft themselves by transmitting false information. They actively employed decoys, anti-radiation missiles, and engaged ground units in radio electronic warfare.

Using ground radioelectronic equipment, the Israeli leaders tried to disorganize command of units in the Arab armies, using false transmissions on their radio nets. The foreign press notes that they even managed, on occasion, to take command of Egyptian Army units and planes. On the Sinai front during the movement of the 4th Egyptian Armor Division to counterattack, the Israeli aggressors, with the goal of disinformation, transmitted a false order, on a radio net of this unit, to withdraw its regiments to the Suez Canal. The order was accepted as valid and the counterattack did not take place.

The U.S. Navy ship LIBERTY, which was monitoring and deciphering Arab radio communications, often transmitted coded false orders in Arabic to disrupt enemy command and control. In the El Arish area, for example, where Egyptian forces tried to organize a defense, this occurred. Receiving false orders to withdraw, which, as became apparent later, came from LIBERTY, they abandoned the city without a fight.

The complex employment of all forms and means of deception in the Arab-Israeli War of 1967, led to serious consequences for the Arab states. Israel occupied the Sinai Peninsula, the Gaza Strip, the Golan Heights, and territory in western Jordan. Experience from this war underscored the significance of deception. The journal FLUGWELT emphasized, "The example of secretly prepared and unexpectedly delivered air strikes undoubtedly introduces new views into the theories of air warfare. It shows that it is not useful to consider just the correlation of numbers of planes, tanks and troops in estimating victory."

During the 1973 Arab-Israeli War, the Israelis also tried to actively employ deception. Considering the experience from the preceeding war, the leaders of Israel paid especially close attention to matters of communciations disinformation, radar decoys, and communications security. However, as noted in the foreign press, the Israeli deception was actively opposed by the skill of the commanders of the Arab country armies. In particular, communications intelligence was especially well organized, their air defense systems proved robust through the employment of mixed groups of several types of radars and antiair artillery which operated at differenct frequencies and wave lengths.

Deception found wide employment in the Anglo-Argentine armed conflict for the Falkland Islands in 1982. The English command took a number of measures to deceive the enemy, the accomplishment of which was the responsibility of all command echelons. According to the foreign press, the British political-military leadership developed a special plan for deception. It contained tasks for disinformation in the press, radio, and television, introduced strict censureship for secrecy, established a regime for radio traffic, and directed other matters. The English command floated an order giving a false location for the amphibious and air assaults.

The English, taking advantage of the lack of preparation of the Argentines for night operations, made their landing on the coast, and their assault on the administrative center of Port Stanley at night. Reserves were landed by sea and air in the San Carlos area at night and in bad weather (sea state 3, wind speed 10 mps, air temperature -3^{0}, rain, snow drifts, fog).

Active offensive operations were taken to seize a beachhead on the island by English forces in darkness also because the Argentine Air Force did not operate in poor visibility. Mission accomplishment normally occurred in the first half of the 24-hr. day. Landings were made in areas which were weakly prepared for defense by the Argentines. Small deceptive landings were made for the purpose of deception which were returned to their ships by helicopter after accomplishing their missions. Reconnaissance groups operated in the enemy rear for three to five days prior to the assaults. They defined the situation, corrected fires by naval guns, and guided aviation.

All ths allowed foreign specialists to conclude that one of the main reasons for the British success in combat in the South Atlantic was skillful use of deception.

On the argentine side, elements of deception were used successfully only in air operations. French-made SUPER ETANDAR fighters with EXOCET antiship

missiles approached their targets, as a rule, in pairs at low altitude. At the same time, a group of supporting planes made demonstrations at medium altitude and attracted to themselves the British Sea Harrier fighters. After acquiring the targets on their on-board radars, Argentine crews launched EXOCET missiles at ranges of 20-40 km. Direct hits by these missiles sank the destroyer SHEFFIELD and the container ship ATLANTIC CONVEYOR.

As emphasized in the foreign press, elements of deception were also contained in the Pentagon plan of preparation and conduct of the incursion in Grenada to overthrow the legal government of that sovereign country. In particular, on October 17, 1983, that is more than a week prior to the direct landing of American forces, the naval headquarters in Norfolk made a false official announcement of the transfer of an amphibious group (five landing craft with the helicopter carrier GUAM with 1800 marines on board) to the Middle East, and on October 19, a carrier group comprising 11 ships and support vessels headed by the carrier INDEPENDENCE, which had more than 80 planes on board. On October 21, both ghese groups received instructions to proceed to the vicinity of Grenada in radio silence. On October 24, the carrier group secretly concentrated 30 miles northwest of the island and the emphibious group 5 miles to the east. In this way until the moment chosen by the President of the U.S., Reagan, for the final decision, the concentration of forces and all preparations had been made in secret.

Experience in local wars convincely demonstrates the importance of deception for achieving surprise. All measures to achieve it were carefully conducted by the commanders. Diplomatic channels, ruling circles, and press reports were all used to distribute disinformation.

Success in war, as emphasized by foreign specialists, is achieved, to a significant extent, by the complex employment of deception. Flights of planes at low altitudes at great speed, use of active and passive jamming, use of helicopters for landing marines, unexpected landings of large airborne forces deep in the enemy rear, airmobile operations, and many other new methods are all part of this. Foreign specialists also attribute security of developments in new combat equipment to the elements of military stealth.

On the whole, experience in recent wars shows that the imperialists are secretly developing plans for invasion, secretly preparing forces for attack, and carrying out a whole complex of deception measures. From this comes the necessity for Soviet servicemen vigilently to guard the victories of socialism and constantly remain combat ready for the repulsion of any aggression.

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PREVENTION OF DELAYED STRESS SYNDROME IN WEST

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (signed to press 10 Oct 86) pp 15-18

[Article by LtCol V. Gavrilovich; "Psychological Training of Imperialist States' Army Personnel"]

[Text] The imperialist states' ruling circles, led by the U.S., are undertaking desparate steps to achieve military superiority over the world of socialism; exacerbating international tension in various regions of the globe to the extreme; unleashing local conflicts with premediation. The intensified development of the latest weapon systems, including mass destruction weapons; implementation of the "Star Wars" program; deployment of first-strike nuclear missiles in Western Europe; U.S. aggression in Korea and Vietnam; the intervention against independent Grenada; the criminal attack on Libya; the undeclared wars against Afghanistan, Nicaragua, Angola and Mozambique; Great Britain's armed occupation of the Falkland (Malvinas) Islands, and the incessant aggressive Israeli actions in the Middle East--all attest to the openly adventuristic direction of the policies of world imperialism.

The United States of America and its allies, nurturing plans for new wars, assigns a special place to the psychological training of armed forces personnel. The latter is an important component of the general training of the servicemen of the imperialist armies for conducting aggressive combat actions under the conditions of modern warfare. It is directed also at developing those qualities necessary for turning soldiers and officers into unquestioning executors of the will of international capital.

An anlysis of the aggressive wars unleashed by the imperialist states' leadership in the past 40 years shows that it managed to achieve its goals to a large degree. The majority of American soldiers and officers in Korea and Vietnam, in Grenada and in Lebanon, showed themselves to be unquestioning executors of the will of Washington's militarists. Without any deviations, they annihilated peaceful inhabitants, revealing their psychology of murder and deprivation of human conscience and honor. The demagogic arguements of the American generals on designating the American warrior for the defense of "freedom" are unable to hide the class-goals of the entire system of study and education for U.S. servicemen--to develop in them an unquestioning readiness

to undertake any criminal acts for the sake of implementing the hegemonistic plans of the imperialist circles.

The English forces that participated in the capture of the Falkland (Malvinas) Islands, according to bourgeois military specialists, also basically vindicated the hopes held out for them by the country's ruling circles. During the course of their aggression in Lebanon (1980), Israeli soldiers and officers carried out many bloody crimes on the soil of this long-suffering Arab country.

In addition, as some foreign sociologists believe, many morale-combat qualities of imperialist states' army personnel consciously place bourgeois military literature in a favorable light. Performing important functions related to the formation in servicemen of those qualities necessary for conducting aggressive wars, psychological training (as with combat training) does not completely assure a reliable level of stability. Above all, Western military specialists single out the low level of emotional-volitionary stability inherent in soldiers and officers. During the wars in Korea and in Vietnam, the average level of psychological losses(1) among American army personnel reached 10 and 12 per cent respectively.

In the U.S. Army's 82nd Airborne Division subunits in Grenada, there were many examples of servicemen losing control of their behavior. American psychiatrists have stablished that even in peacetime disruption of the psyche is encountered in 6 per cent of the soldiers and officers. During Israel's aggression in Lebanon, the number of servicemen subject to psychological shock was no lower than in the October 1973 war when they ranged from 3-5 per cent of the total number.

Western specialists have come to the conclusion that their personnel are insufficiently prepared psychologically to conduct combat actions under the conditions of modern warfare. Under the influence of combat in Korea, only 15 per cent of American soldiers at the FEBA shot at the enemy after aiming. Even in well-trained subunits, no more than 25-30 per cent of the personnel conducted effective fire. Of the 320,000 American servicemen participating in the aggression in Vietnam, 58,880 conducted combat actions "well," 235,200 "fair" and 25,920 "poorly." In 1984, the American command, during a discussion in ARMY magazine was forced to justify itself on the issue of the servicemen's insufficient preparedness for combat activities in Grenada. "In carrying out the invasion of Grenada in 1983, the U.S. government depicted its actions in the most cheerful way," THE WASHINGTON POST reported. "And, since they banned the means of mass information from covering the events on the island during the battles, no one could contradict the official version of a precisely orchestrated military operation. Only after much time had passed did the facts about the shortcomings of the American's actions, their ineffective fire, the losses from their own shells, and unaccomplished combat missions filter into print."

Many bourgeois military scientists believe that the level of the morale-political condition of the imperialist armies' servicemen is rather low. According to foreign press data, the number of American troops deserting in Korea from 1951 through 1953, grew from 14.3 from 22.3 per thousand servicemen

(per month), and in Vietnam from 1965 through 1973 - from 15.7 to 62. As the MILITARY REVIEW magazine conceded, the American soldiers and officers turned out to be inadequately trained in a morale-political aspect even in combat in Grenada. During Tel-Aviv's military machine's aggression in Lebanon, about 1,500 servicemen deserted, or, for one reason or another, refused to participate in combat activities.

Attempting to strengthen the volitional stability of its personnel, the commands of the imperialist states' armies exert special efforts during psychological training in the following directions:

--the formation of the servicemen's individual physical and psychological endurance so that they are ready to overcome the various difficulties of combat and camp life and ready for activities under extreme conditions at an intense pace;

--increasing the stability of each soldier's and officer's professional and combat skills in the interests of rapid and timely performance of their duties on the field of battle;

--the formation of psychological readiness for unexpected combat actions under modern warfare conditions.

--developing and reinforcing in each soldier's and officer's psychology such qualities as unassumingness, unpretentiousness and moderation in wants and needs, which must replace the inclination towards comfort and the inability to conduct combat actions under unfavorable physical and climatic conditions;

--formation of firm group cohesion within the military collective, produced by having all the servicemen perform joint service duties.

Realization of these directions in the psychological training of personnel is carried out on the basis of cultivating bourgeois ideological values in their hearts which enflame social and class antagonisms among the servicemen. It is accompanied by saturation of the atmosphere with general suspicion and mutual alientation which further puts into practice the soldiers' and officers' training in the class interests of the ruling circles of the NATO countries, and in turning their armies into a reliable instrument of adventuristic and aggressive policies.

Psychological training in the imperialist states' armies is conducted within the framework of combat and physical training, as well as in the ideological cultivation of the personnel. It can be conducted in different ways, using original forms and methods, in different periods, depending upon the system of study taking shape in one or another state.

In addition, in recent years, as noted in the Western military press, a unified curriculum for psychological training has begun to take shape in all NATO countries whose basic elements are being adopted by their partners in other regions of the world. Problems in this area are discussed by representatives of the North Atlantic bloc at annual symposia on military

psychology which also help to establish uniformity in the methods of nurturing morale-psychological qualities in all the imperialist states.

The ultimate goal is to prepare each soldier and officer psychologically for the effects of the destructive elements of modern war and to endure the burdens of combat actions. It is believed that, during battle, the personnel could display such negative symptions as uncertainty in their strength, physical lethargy, apathy, feelings of fear, etc. Therefore, servicemen are not always prepared to endure the physical and psychological loads of combat, they refuse food, forget about their service duties, and desert. The task arises to develop in each soldier and officer the physical and psychological endurance, confidence in one's capabilities, and stability in the face of the influence of the elements of the combat situation.

Originally, psychological training had been conducted within the framework of physical training for which a significant amount of time was allocated. They cultivate the armed forces the types of sports which nurture what is considered an "aggressive spirit." Among them are boxing, judo, karate, kung fu and others. In order that physical training be more effective, specialists developed, and actively use in training, methods for forming the necessary qualities for combat actions.

Besides that, they practice frequent alerts, sprint marches up to 60-90 km and actions by individual soldiers and whole subunits in bad weather. In bourgeois military specialists' opinion, all this "agitates well" the servicemens' psyches, and makes them hardier and more physically prepared. In many Western countries they are even creating special scientific centers where soldiers are taught to overcome hunger, to keep up their stamina during lengthy combat actions, form skills to remain motionless for a long time, and develop their skills for actions under the most complex climatic conditions. For this, specialists in the U.S., above all, consider that American soldiers would fight in various regions of the globe, where Washington's expansionist desires are aimed. For that reason, combat and psychological training is tailored to the conditions of the locale of the actions for which the servicemen are preparing. In Israel, they practice long outings in remote desert regions to check the level of the soldiers' readiness to conduct combat actions.

Psychological training is conducted also within the framework of combat training, primarily at the initial stages of the personnel's professional study. Psychologists in the West procede from the fact that modern war would negatively effect the behavior of even a physcially and psychologically strong soldier or officer. One way or another, they will lose control over their actions. In order to avoid this, special exercises are held. In the process of teaching the servicemen to carry out their professional duties the instructors bring down on them a series of severe physical, psychological and moral irritants (they imitate the situation of modern warfare, give a host of conflicting commands, and use crude preemptory shouts and physical violence) which evoke shock-like conditions in the personnel, expressed in a general depression of the psyche, volitional passiveness and the absence of the strength to do anything. The soldiers begin to feel inferior, and fear condemnation from their colleagues and commanders for their weakness, and their psyches turn out to be subdues to a certain extent.

According to bourgeois military psychologists' opinion, under these conditions, the officers must "come to the aid" of the personnel, bring their consciousness to a "normal state," bring it up to a level where the soldiers are able to perceive their commander as a person who "helps" them overcome the difficulties of the combat situation and their own impotence and inferiority. Natually, the main point of this does not lie in displays of real concern for subordinates. The officer has a single purpose for this activity - to get them to carry oout orders by any means. It is natural, in the given situations, that the servicemen's psyches are further harmed. Thus, we are in fact talking about the disfigurement of a person, turning him into an unthinking mechanism in the bourgeois military machine working flat out to achieve the militarist designs of imperialism.

The reactionary essence of this element of psychological training is demonstrated especially graphically in the influence on well-defined categories of personnel. In the U.S. armed forces, methods of racial pressure are widely used in which representatives of the white population hound black and yellow-skinned servicemen. In approximately the same manner, the Israeli army sets the emigre from Europe (Ashkenazi) against those who came to the country from African or Asian states (Sephardi). In the armed forces of the imperialist states, it is recommended that the inferiority of the servicemen who are recruited from the poorest levels of capitalist society be demonstrated relative to the representatives of the petty bourgeoisie and bourgeoisie circles.

The attempt is made to convince the poor, black, and yellow soldiers that their displays of fear and physiological and psychological instability, in a combat situation, are a consequence of their belonging to lower races and indigent classes. Doing this sets in motion the mechanism for forming nationalist feelings which force these servicemen to prove themselves more aggressive in combat and to carefully hide their weakness. It is not accidental, therefore, that the Western press has noted that American soldiers (Negroes, Mexicans, and Puerto Ricans) in Korea, Vietnam, and Grenada and Israeli sephardic servicemen are distinguished for their more stable morale-combat qualities.

During combat training, special attention is devoted to "psychological stimulation" consisting of the development of special psychological qualities facilitating the effectiveness of their combat actions--aggressiveness, offensive impulses, indifference to the horrors of the combat situation, etc. It is believed that these qualities will distract servicemen from the fear of the effects of the destructive factors of the weapons used in modern wars.

In the interests of soldiers' "psychological stimulation," they are taught under especailly complex conditions. For this, special training complexes, from which the necessary qualities have been developed. Thus, at the instructor's command, a soldier, with a rifle pointed forward and bayonet fixed, enters a darkened room and, following a beam of light, advances further inside. From all sides mechanical dummies are thrown at him accompanied by wild howls to represent an attacking enemy which the student is obliged to destroy with bayonet charges. All this is accompanied by groans, moans and piercing shouts.

Such methods are used in combat firing exercises also. From 50-70 m in front of men in trenches, targets flash by which they must destroy with fire from their weapons. Shells "burst" around them. The bursts of grenades are imitated 2-3 m above their heads or the lethal elements of real projectiles sweep overhead. In English military psychologists' estimation, "direct experience" of combat conditions in a training situation can make it significantly easier to carry over one's combat reactions. For this, they try to make it such that pressure experienced by the servicemen increases from exercise to exercise. As a rule this is achieved by producing real pictures of combat, i.e. naturalization, for which training grounds and ranges are specially equipped. In the words of the magazine NATO's FIFTEEN NATIONS, training grounds must create a "somber environment" because that is what agitates "the aggressive instinct;" the serviceman's eye must encounter signs of destruction all over, his ear must get accustomed to combat sounds and the moans of the wounded, soldiers must indifferently take in burned-out areas, ruins, and corpses. It is considered positive if one scatters plaster casts of corpses and domestic articles around the training field. And the more horrible and repulsive these articles are the better, writes the magazine.

Bourgeois military experts, in analyzing the results of the American army's combat actions in Vietnam and Israel's aggressive wars in 1967, 1973 and 1982, began to substantiate the necessity of special prior "tempering" of servicemen's psyches, and then also developed special recommendations for carrying it out. When training Israeli military personnel for the attack on Lebanon in 1982, the servicemen of Great Britain's army for capturing the Falkland (Malvinas) Islands, and the U.S. Army for the occupation of Grenada, these methods were thoroughly approved and are now included in the system of general psychological training for NATO troops.

In order that psychological training be more directed and effective, special organs were set up in the imperialist armies to monitor its progress constantly. In the U.S. armed forces, there is, in every division's medical batallion, a psychiatrist, a psychologist, a sociologist and 6-8 aides drawn from the junior command structure, who develop methods for psychological training, follow its progress and assist commanders at all levels on these matters. The methodological bases of psychological training are developed by a special department of the U.S. Army's Walter Reed Research Institute whose officers conduct the corresponding research in units and tactical formations. In the Department of the Army, these matters are handled by a directorate for providing for the morale-psychological conditions of the personnel.

In the Israeli armed forces, psychological training is organized by psychologists of the tactical formation (brigade and division) headquarters. They are monitored by a department of social-psychological research of the general staff whose officers constantly visit the troops to check their readiness to conduct aggressive wars in the interests of Tel-Aviv's Zionist circles. In the armies of the FRG and Great Britain, a special psychological service has been established which is represented in operational and tactical formations by a psychologist at headquarters and a psychiatrist in the medical batallions (regiments) and a directorate for psychological support of combat actions in the general staff of both countries.

According to foreign specialist' estimates, psychological training in the armies of the Imperialist states facilitates a strengthening of the combat qualities and morale preparedness of the personnel under the conditions of modern warfare. Being class-oriented, it pursues the goals of turning the armed forces into a reliable weapon for the realization of the aggressive policies of imperialism.

1. Psychological losses are those losses in personnel resulting from the effects of all forms of enemy weapons (including nuclear missiles) and the accompanying destructive factors. They indicate that servicemen have experienced a severe psychological state, depriving them of their ability to fight: fear, panic, mental shock, fits of hysteria, motor paralysis, partial loss of memory, sight, and hearing, disruption of the ability to control digestion and urination. It is believed that 10 per cent of psychological losses are irreversible and recovery for the remaining 90 per cent requires various amounts of time--from several hours to several days.

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BELGIAN GROUND FORCES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (signed to press 10 Oct 86) pp 19-23

[Article by Maj A. Vasilyev; "Belgian Ground Forces"]

[Text Belgium is an active member of the aggressive NATO bloc and conducts a policy which is derived from participation in that bloc. Its political-military leadership supports increasing the military might of the North Atlantic alliance as a whole and of its own country in particular. Carrying out a ten-year program (1982-1991) for building up its armed forces, it pays particular attention to development of its army, combat organizations and units of which are intended for transfer to the combined armed forces of NATO in Europe.

The army is the basic branch of the Belgium armed forces. It contains 68,000 personnel, which comprises about 75 per cent of the total strength of the armed forces. Leadership for it is provided by the army chief of staff, who is actually its commander. He is responsible for the army's condition, combat and movilization readiness, and development of plans for its organization and employment. In general, the army is divided into combat forces and internal forces.

COMBAT FORCES - are forces intended for transfer to NATO. They are assigned to the 1st Corps.

I Corps - is the army's operational-tactical organization, intended for participation in operations as a component of the Northern Army Group in the Central European theater. It has two motorized infantry divisions (1st and 16th) and corps units, including a battalion of LANCE missiles (4th), a 203.2-mm self-propelled (SP) howitzer battalion (8 guns). two Improved HAWK battalions (of 18 launchers each), two battalions of GEPARD 27 launchers), a reconnaissance battalion (24 light SCORPION tanks), 12 SP STRIKER vehicles with SWINGFIRE ATGMs, 24 SCIMITAR recon vehicles) an aviation squadron (24 ALOUETTE helicopters), and support units. A major part of the corps strength, which totals about 40,000 (the 16th Motorized Infantry Division and corps units), is located in the FRG. The Corps headquarters is located in Belgium (Koln).

The motorized rifle division (Figure 1) is the highest tactical unit in the army and is designed for combat, as a rule, as a component of a corps. During wartime, it may contain two or three motorized infantry brigades and one tank brigade, and units subordinate to the division: a 155-mm SP howitzer battalion (18 guns), a cavalry squadron, an aviation squadron, and combat and combat service support units (altogether about 16,000 personnel).

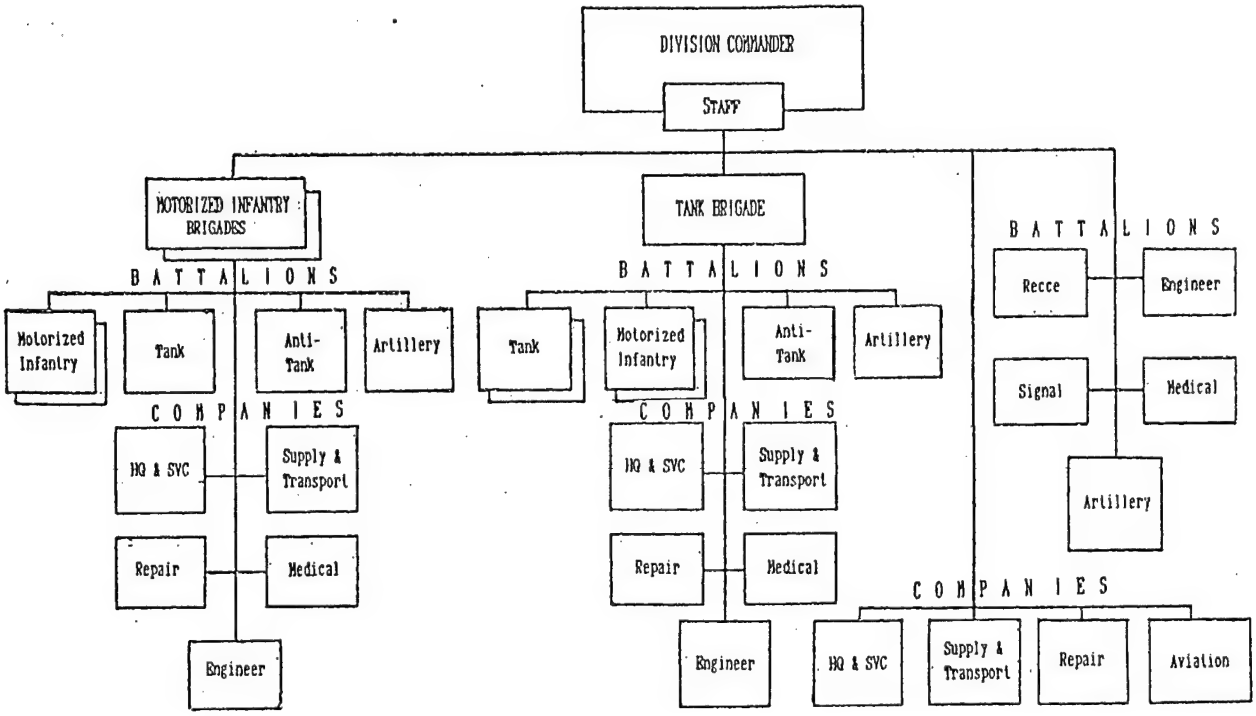

Figure 1. Belgian Motorized Infantry Division Organization

As the foreign press reports, in peacetime both divisions only have two brigades each: in the First MRD the 1st and 7th Motorized Infantry, and in the 16th the 4th Motorized Infantry and the 17th Tank. The remaining motorized infantry brigades (the 10th and 12th) are cadre units which can join the existing divisions after mobilization.

Forming the corps and the divisions is planned for wartime as well as during training. In peacetime, the brigades and corps and divisional units are directly subordinate to the corps headquarters. Also, corps and divisional units are grouped by branch for ease of control and training effectiveness. So, in the field artillery group there are five battalions: one LANCE missile battalion, one 203.2- and two 155-mm SP howitzer battalions, and an artillery reconaissance battalion; in the air defense group there are two battalions each of I-HAWK and GEPARDs; in the engineer group there are two engineer and pontoon bridge battalions; and in the signal group - four signal battalions; in the support group there are six motor transport battalions.

A motorized infantry brigade (3,800 personnel) is a ground tactical unit. Organizationally, it contains two motorized infantry, one tank, and one antitank battalion, a 155-mm SP howitzer battalion, and support units.

A motorized infantry battalion (760 personnel) consists of four companies (headquarters and support, and three motorized rifle). It is equipped with four 106.7-mm mortars, 24 MILAN ATGM launchers, about 50 infantry fighting vehicles, cavalry fighting vehicles, and armored personnel carriers.

A tank battalion (about 500 personnel) has four companies (headquarters and service and three tank companies). It is equipped with 40 LEOPARD medium tanks and two SCORPION light tanks.

The antitank battalion (about 300 personnel) includes three companies (headquarters and service, 90-m JAGDPANZER SP antitank gun, and ATGM). It has 12 antitank guns and 12 MILAN ATGM launchers, as well as about 20 armored personnel carriers. An artillery battalion has four batteries: headquarters and three firing batteries (each has six 155 mm M109 SP howitzers).

A tank brigade (more than 4,000 personnel) is a tactical army unit. It has two tank, two motorized infantry, one antitank, one 155-mm SP howitzer battalion, and service units (an organization similar to those shown above).

INTERNAL FORCES are subordinate to the commander of internal forces, who commands them through his headquarters. They are intended for territorial defense missions, mobilization of the armed forces and rear support, defense and security of important military targets, rendering necessary aid to the forces of allies when they are stationed on Belgium territory, etc.
The headquarters of internal forces, judging by the foreign press, has three branches (training, mobilization, and support), which accomplish the planning and employment of the units under their control.

The training branch has an independent parachute regiment "commandoes," which is the army general reserve, and territorial forces: nine "provincial regiments" (one to each province), two light infantry regiments, several infantry battalions and guard battalions. Also, the peacetime the training branch has the 10th and 12th Motorized Infantry brigades from the 1st Corps.

The Commando regiment is the most combat ready unit in the internal forces. It has 12 SCORPION light tanks, 12 SCIMITAR cavalry vehicles, six 105-mm howitzers and other combat equipment. One if its parachute battalions is part of the NATO mobile force, and in case of necessity, the entire regiment can be sent there.

The mobilization service is designated for matters of mobilizing army units. At its disposal are mobilization centers, and stores of weapons and ammunition. Rear support, which performs material-technical support of army units, as well as other branches of the armed services and military police, is organized into three support groups, including transport battalions, arsenals, stores, and so forth.

The organization of internal forces in peacetime (about 30,000 personnel) contains (excluding the commando brigade) a reduced cadre of about 3-5 per cent, and stored weapons. In wartime its personnel strength may reach 83,000.

As the Belgium press reports, the Belgium Army has for equipment (including that in storage) Lance missiles launchers (5), LEOPARD-1 tanks (334) and SCORPION light tanks (116), SCIMITAR cavalry fighting vehicles (154), and infantry fighting vehicles (about 1,500), howitzers: 203.2-mm M110 (15), 155-mm M109 (39), 155-mm M109A2 (124), 155-mm M44 (25) and 105-mm M108 (90), JAGDPANZER SP 90-mm antitank guns (80), MILAN ATGM launchers (about 300), STRIKER SP launchers with SWINGFIRE AGFMs (40), IHAWK launchers (30), GEPARD 35-mm antiair guns (54), about 70 helicopters and 5 army planes.

MANNING the army is accomplished on the basis on the law governing universal military service, as well as volunteers on contract and officer cadre training.

Drafting for military service happens to men who reach 19 years. They serve on Belgium territory for 10 months and in the FRG for 8. Now there is discussion about lengthening the term of service by two months. Also, it is planned to increase the term of service by 3-6 months on a voluntary basis by signing servicemen to short contracts.

Army officer recruits are obtained principally through the officer schools, reserve officers and non-commissioned officers. The mandatory retirement age for officers, depending on rank, is from 50 to 61.

At the present time, the Belgium Army has a strength of more than 4,000 officers, 13,000 non-commissioned officers, about 5,000 volunteers, 21,500 draftees. The number of civilian employees is 1,600.

Training for the draftees includes three phases: basic, speciality, and unit. Draftees are sent either to training centers for branch training or directly to units.

Non-commissioned officer training is conducted in branch training centers. Upon successful completion of this training they are promoted to the rank of sergeant.

Officers are trained in the royal military academy, the royal military school, and military schools.

The Royal Military Academy trains mainly senior officers for a two-year period. The annual selection totals 40 officers. Senior officers are also trained in the military academies of the NATO countries. There are also short courses at the academies for training staff officers (up to 70 officers per year).

The Royal Military School is the principal institution for the training of officer cadres. Instruction takes place in command (4 years) and engineering (5 years). About 120 officers graduate annually, who, after a tour in a branch training center, are sent to units.

The military schools (with a course length of two years) train young commanders with a subsequent service of not less than six years. Upon completion of the school graduates undergo a 6-8 month special training in branch training centers before being sent to units.

Unit combat training is conducted in accordance with the general requirements of the NATO armed forces. Every year various contingents of the army (up to a corps) take part in the principal NATO exercises.

PROBABLE DEVELOPMENTS Development of the army is accomplished in accordance with the NATO coalition strategy. Realization of these demands, in Belgium leaders' opinion, will significantly contribute to the fulfillment of the ten-year program of increasing military strength. This program is envisioned to increase the mobility and fire power of army units, the effectiveness of air defense and antitank operations, ensure reliability, flexibility, and durability of troop command. Accomplishing these missions will largely be ensured by equipping units with modern weapons.

A great deal of attention has been paid in the program to raising combat capabilities of artillery. In 1984-84 the artillery units of the I Corps received U.S. M109A2 155-mm SP howitzers (124 altogether), which replaced M108 105-mm howitzers in four artillery battalions subordinate to brigades, and M109 howitzers in two divisional artillery battalions. The M109 howitzers replaced in the divisions are being transferred to the artillery battalions of the 10th and 12th Motorized Infantry Brigades to replace old artillery systems. At the same time, the M109 155-mm and M110 203.2-mm howitzers are being modernized as a result of which their range will be raised respectively to 18 and 30 km. New rounds are being supplied for 155-mm howitzers which will add range and lethality. To increase accuracy of fire and reduce the preparation time for firing it is intended to obtain about 90 laser range finders, 6 weather stations, 10 fire control computers, 38 ground navigation systems, and 18 field ballistic stations.

Army mobility and fire power are to be increased in a program of adding new infantry fighting vehicles and personnel carriers. Altogether 514 AIFV-B infantry fighting vehicles and 525 M113 APCs have been purchased. Their delivery to units has begun, and the program is to be completed by the end of the 80s. In the 90s, they plan to either modernize the LEOPARD-1 tanks or buy new ones.

The plan calls for increasing the antitank capabilities of units by additional issues of ATGM launchers, and acquiring anti-tank helicopters in the near future.

They plan to raise the effectiveness of air defense by obtaining the American PATRIOT missile and NIKE HERCULES, and placing in service about 150 French MISTRAL missile systems.

The system of command and control is being improved. As reported in the foreign press, the equipping of the units of the I Corps with the RITA automated communications system was completed in 1985. By the end of the 80s, theyintend to issue new AM and FM radio sets.

On the whole, in foreign military specialists' opinion, measures for reequipping units will significantly increase the Belgium Army's combat capabilities.

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REFRESHER TRAINING FOR U.S. ARMY RESERVISTS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (signed to press 10 Oct 86) p 31

[Article by LtCol I. Aleksandrov; "Refresher Training for U.S, Army Reservists"]

[Text] Among the measures Americans are taking to raise combat and mobilization readiness, great attention is paid to increasing the quantity and improving the quality of the members of the Individual Ready Reserve (IRR). It has an important role in U.S. plans for transitioning from a peacetime to wartime situation.

American military specialists consider the IRR the first source for meeting personnel requirements in a mobilization situation until the necessary training contingents can be organized. New divisions and brigades are planned to be formed from this resource, and, when combat activities begin, replacement of casualties. In this regard, the plans are that, upon their recall to active duty, they should not require additional training.

According to reports in the foreign press, at the present time, there are more than 285,000 reservists in this category in the army, of whom about 180,000 are enlisted men. It is noted that their level of military training varies, since the length of their active service, which proceeded their entry into the IRR, could be from 4 months to 5 years, and the length of their reserve service could be from 6 months to 13 years.

With the goal of improving on the knowledge and skills acquired while on active duty, reservists annually undergo refresher training. A two-week refresher training course, initially for reserve infantrymen, has been set up and is being tested in the 70th Division. The 90-hour program of instruction includes the following subjects.

WEAPON FIRING (43.5 HOURS) During this course, the material elements of the organic weapons and anti-tank weapons of an infantry platoon are studied, and instructional and qualification ranges are fired. Sixteen hours are devoted to the M16A1 rifle (8hours to firing, 9 hours to the M60 machinegun, 8.5 hours to the 50-cal M2HB machinegun, 4 hours to the M203 40-mm grenade launcher, 4 hours to the M72A light anti-tank weapon. In theoretical instruction, personnel learn the assembly and mantenance of the weapons, specifics of their

functioning, prevention of stoppages, and rules of preparation for firing and tranisition from firing to moving status (for the grenade launcher). The program of firing instruction also includes employment of hand grenades (2 hours).

MEDICAL TRAINING (13.5 HOURS) Principles of first aid and for wounded and casualties of heat, light and chemicals are studied. Instruction includes application of splints, prevention of shock, and purification of water.

MILITARY TOPOGRAPHY (12.5 HOURS) One hour is devoted to orientation with a map and compass. During a 10.5-hour period, the reservists study terrain and conduct a move in daylight and dark on difficult terrain.

PHYSICAL TRAINING (7 HOURS) Includes actual training (4.5 hours) and a test (2.5 hours).

ENGINEER TRAINING (5 HOURS) Two hours are devoted to studying the design and employment of the M18A1 mine and one hour each to camouflage of individual positions and weapons, camouflage of firing positions, and entrenchments.

TACTICAL TRAINING (3 HOURS) is conducted to review such topics as movement under fire (1 hour), overcoming obstacles on the battlefield (1 hour), and actions of the soldier as a member of a fire team (1 hour).

Also, 1.5 hours are devoted to instruction on the M17 protective mask and 1 hour each to collecting and diseminating intelligence, the AN/PRC-77 radio, guard duty, and basic communications.

To check the effectiveness of the program, more than 100 reservists were called up. After undergoing refresher training, alsmost all passed their qualifications and were certified qualified for military service.

American specialists consider that development of such a program for refresher training for ready reservists assists in maintaining the training of reservists at the required level, significantly shortens the mobilization time, and raises their combat readiness.

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COMBAT EMPLOYMENT OF MAVERICK GUIDED MISSILES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (signed to press 10 Oct 86) pp 33-37

[Article by LtCol E. Sergeyev; "Combat Employment of Maverick Guided Missiles"]

[Text] According to the views of the aggressive imperialistic NATO bloc's military experts, air-to-surface guided missiles (UR), of which the MAVERICK guided missile is one representative, are a widely deployed and effective means of solving the missions placed before their air forces for destroying small armored ground and surface targets. According to foreign press reports, five variants of this missile with various seekers (GSN) have been developed at the present time in the U.S., including: the AGM-65A and B with television guidance, the AGM-65D with IR guidance, the AGM-65E with laser guidance, and the AGM-65F with IR guidance. According to American specialists' statements, in comparison with MAVERICK missiles, equipped with television GSN, the later modification UR have greater capabilities due to the use of new seekers. For example, their limitations, imposed by weather conditions, have been significantly reduced and the target lock-on and missile launch range increased, etc. The tactical-technical characteristics of the MAVERICK missiles are presented in the table. Several issues regarding the combat employment of MAVERICK guided missiles with various modifications are elucidated below according to information published recently in the foreign press.

THE AGM-65 AND AGM-65B GUIDED MISSILES are distinguished from one another in that a television seeker with a 5 degree view-angle is mounted on the first, and one with a 2.5 degree view-angle is on the second. The GSN's reduced view-angle provides the capability to detect targets and to accomplish its lock-on at a greater distance. Although the MAVERICK's range is 20 km, on the average, depending on atmospheric visibility and lighting conditions, the nominal confident lock-on range for small targets by a television GSN varies from 4-6 km (with a strike deliveries from low altitudes).

The pilot takes the following actions when employing these missiles. He executes the flight to the target at low altitude. After visual target detection and identification, the pilot positions his aircraft to the target's side. After this, he moves the weapons selector switch to the position

The Tactical-Technical Characteristics of MAVERICK Guided Missiles

MAVERICK VARIANT (IOC)	BODY DIMENSIONS (mm) LENGTH	DIAMETER	LAUNCH WEIGHT (kg)	FLIGHT SPEED (Mach)	MAXIMUM FIRING RANGE (km)	WARHEAD WEIGHT (kg)	MAIN CARRIER AIRCRAFT
AGM-65A, B (1976)	2460	300	210	2	20	59	F-4, A-7, A-10, F-16
AGM-65D	2460	300	210-290	2	20	59-135	A-7, A-10, F-4 F-16, F-15, F-111
AGM-65E	2480	300	290	2	15	135	AV-8B
AGM-65F	2490	300	290	2	20	135	A-7E, F-18

corresponding to the missile selected by him, thereby issuing the commands to it for ungaging the gyroscope and shedding the GSN's nose cone. At the same time, the pilot climbs to 150-250 m. The terrain image from the GSN is sent to a cockpit sighting display. The pilot, tracking the target visually, pilots the aircraft such that its image appears on the screen. When detecting the target on the screen he overlays an electronic cross-hair on it by manually turning the seeker and pushes the "Track" button. As a result, the GSN is switched to a target tracking mode. In executing the missile launch (from a permissable distance), the pilot pulls the aircraft from a dive, in which he started by maneuvering during aiming (the maximum time of the latter is 10-15 seconds), and depending on the task or situation, either breaks off from combat or searches for a new target.

To use the AGM-654B, several changes were made to the sighting system, the result of which four markers light up on the pilot's display, instead of the electronic cross-hair, with which he frames the selected target. Additionally, there is an electronic cross on the screen, positioned relative to the center marks, which shows the angular deviation of the GSN's axis (in the target tracking mode) from the aircraft's longitudinal axis. If this angle exceeds the allowable limits, the cross begins to periodically change its brightness (blinks). In such a case, the pilot has to aim the aircraft more precisly toward the target. In addition, in the upper left corner of the screen, the sector lights up, which begins to blink, if the missile's GSN does not distinguish the target (if the distance is too great, the size is to small or the optical contrast insufficient). The sector and cross light up with constant brightness when lock-on and target tracking conditions are acheived.

In evaluating the combat employment results of the MAVERICK with a television GSN (AGM-65A) during the Vietnam War, unleashed by Americal imperialism, and also during flight trials and exercise training launches (AGM-65A & B) during daily combat training of air force units and subunits, Western military

experts note, that these missiles possess fairly high accuracy, and according to their calculations, the probability of the UR striking small targets (tanks, BTRs, etc.) averages 85 per cent. However, it is emphasized, that such a showing was achieved under favorable conditions (only during the day and when the target was held visually) in which it is possible to use an UR with a television GSN. According to military experts' views, this condition imposes great limitations on the use of missiles in the environment of the Central European and Northern European theaters of military operations, especially in winter time because of the significant reduction in the length of a day and frequent fog and cloud cover. Therefore, according to their caluclations, it is only possible to use UR with television GSN effectively in this period during 30 percent of the daylight period.

The AGM-65D is equipped with an IR seeker. It was developed to overcome the limitations mentioned above. It is considered, that this missile can be used both during the day, and at night in good and bad weather with smoke and dust over the battlefield. Additionally, with other conditions equal, its GSN can lock-on to targets at ranges of 9-12 km, which is almost double the TV-guided AGM-65A and B, and in winter time, the potential for its use is only reduced 10-12 per cent, and not 70 per cent.

The pilot's operations sequence for employing the AGM-65D is practically the same as with the launch of TV-guided missile. During the approach to the target, he sets the weapon selector switch to the necessary position (the cover of the GSN's nose fairing is released and the missile's gyroscope uncaged), detects the target on the display, aims and launches the missile. Besides armored equipment, with operating or recently switched off engines, aircraft at airfields which generate sufficient heat power sources permitting their detection and GSN lock-on for the distance mentioned above, the AGM-65D can also be used against artificial structures with a heat contrast relative to the background of the earth's surface.

Initially, it was planned to equip the missile with a hollow-charge type warhead from the AGM-65A. However, with the further development goal of increasing its effectiveness, it was decided to install a more powerful fragmentation-explosive warhead weighing 153 kg with a selectable time-delayed explosion.

According to foreign press reports, two variants of employment tactics for the AGM-65D are being worked out. In the first, a forward-looking IR on the aircraft will be used for search and initial target detection, and in the second, these operations will be accomplished using the missile's GSN.

The AGM-65E MISSILE, being developed by order of the U.S. Marine command, uses the laser GSN, developed by Rockwell for the HELLFIRE antitank guided missile. It can operate only when the target is illuminated from the ground or air (a coded signal). During the aircraft's flight in the target deployment area, the GSN searches for the beam reflected from its laser. When detecting the siganl (at a range of 18 km), the homing head locks-on to the target and tracks it without crew participation. The missile launch range, consequently, does not

depend on the target dimensions, but is determined only by the power of the signal reflected from it.

As the Western press notes, the AGM-65E can be used on aircraft without any kind of reequipping. However, in comparison with the missiles equipped with television and IR seekers, with which the actual target image is observed on the sighting display, in this variant, only symbols light up on it. During the seeker's scanning in the search mode, a cross-shaped mark is formed on the screen, which changes its position on the screen according to the seeker's deflection. After locking on to the signal reflected from the target (targets), a square marker lights up on its position, notifying the pilot that the target is locked-on and being tracked.

The AGM-65F MISSILE with an IR seeker is being devloped at the Navy command's order for use against sea targets. It differs from the AGM-65D guided-missle in that its seeker is optimized for hitting the ship's most vulnerable points. The ship's large IR contrast against the water's surface allows the target lock-on range to be increased, so that missile launch can be executed from a range greater than 9 km.

As the American press reports, the planning of strike delivery operations using the AGM-65 guided missile consists of the following.

First, it is necessary to determine the number of ships in the formation, their type and movement, using reconnaissance aircraft.

Second, the criterion for hitting the ships (the destruction of the weapons, loss of headway, sinking) must be determined. Often, due to the MAVERICK's high accuracy, the main mission, especially during operations against groups of missile ships, is to put their armament out of commission.

Thirdly, it is necessary to analyze the aircraft's formation and means of destruction required for delivering a strike with the given effectiveness. Besides the MAVERICK, aircraft can be outfitted with antiradar missiles and other weapons. To support their actions, it is planned to use AWACS (for example, E-2C HAWK EYE) and the EW (EA-6B PROWLER) aircraft.

As American military experts figure, the working out of all stages of the flight route to the target and the coordination of the aircraft operations for delivering the strike aginst it is an important planning element. All this must be done, based on the time of day, weather conditions, lighting, sea conditons, and the proximity and characteristics of the coastline. Thus, it is necessary to select the place, time, and direction for delivering the strike which provides the maximum advantages to the attacking aircraft. Specifically, according to their views, daylight and visibilty of approximately 20 km may be the ideal conditions for using the MAVERICK guided missile with an IR seeker, at the same time, the sun must illuminate the target and mask the attacking aircraft. Several attacks can be conducted during a raid. In this case, as the foreign press mentions, attacking all ships in the group in the first pass on the target is optional. They think it is more expedient to plan the attack by concentrating strikes against the most important targets, and neutralizing

their weapons, and subsequently stopping their movement and even sinking them by other means.

According to Western military experts' opinions, the selection of the strike delivery tactics against ships using the MAVERICK guided missile depends on the aircraft strike groups' composition. For example, in case of executing the attack by a single aircraft, the flight to the target must be conducted at very low altitudes in a radio silence mode. During this time, the strike aircraft must move to a point from which detection of the target by onboard systems is guranteed. In this case, the pilot (crew) positions his aircraft at an assigned point using an autonomous inertial navigation system. During the approach to the target detection zone, he accomplishes a visual search for it, or maneuvering his aircraft in a horizontal plane, looks over the area of its deployment using the missile's IR seeker. The experience of testing the MAVERICK with an IR seeker over the ocean shows, that with average conditions (light cloud cover, daytime, sea state 3), the pilot can detect the target visually, turn on the necessary switches, position the target in the missile seeker's field-of-view by an aircraft maneuver, switch to aiming with the IR display, discern target lock-on and launch the missle before entering into the ship's air defense system's operational envelope. Otherwise, he must execute a turn or half-loop, and exit from it to carry out a subsequent, more effective pass.

The missile launch can be executed in salvo against one target with one pass (the explosion of the first missile is set up for an immediate explosion and the remaining missiles with an assigned calculated delay). The attack can be repeated from another direction. The typical breakaway maneuver from the attack is a descending turn.

The foreign press notes, that the strike aircraft flight, having four MAVERICK guided missiles on each aircraft, represents a very serious threat. As a rule, their operations tactics consist of the following. During the approach to a selected point, the aircraft disperse into a line abreast formation. This allows each pilot to concentrate on aiming, reduces the danger of colliding with their own aircraft in the combat formation and complicates the mission of the enemy's air defense system. Additionally, the break into a line abreast formation provides the capability to search for and attack several targets simultaneously.

In foreign specialists' opinions, aircraft with antiradar missiles or torpedos must definitly be included in a strike element compositon in the future. In the last case, torpedo carrying aircraft will fly behind aircraft equipped with MAVERICK missiles, which select the targets and attack them, thereby designating the targets for the strikes by the torpedo carriers.

During a flight's attack at night, besides breaking into a line abreast formation, it is planned to employ a maneuver at speed and altitude and in the direction of approach to the target in order to insure flight safety. Each aircraft must execute the breakaway from the target independently.

It is condidered, that a massed raid on a group of ships by larger forces must be executed in conditions of close cooperation between several flights of

strike aircraft and support aircraft. Control of such large aircraft groups, in American and other NATO country military specialists' opinions, is very complicated from the point of view of coordinating their operations. However, such groups can deliver more powerful strikes in a short time. Hence, it is planned to conduct the attack by groups of aircraft from various directions at short time intervals.

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CAPITALIST COUNTRIES' TRAINING/COMBAT-TRAINING AIRCRAFT

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[Article by Col Yu. Alekseyev; "Capitalist Countries' Training and Combat-Training Aircraft"]

[Text] In building up the combat power of the air forces, the principal capitalistic countries' military leadership are expending a great deal of material resources toward maintaining an enormous number of various purpose aircraft, including training aircraft. Judging by foreign press reports, there are approximately 8,000 training and combat-training aircraft in the capitalistic countries' air forces, including more that 900 two-seat variants of combat aircraft.

The flight training system adopted in the air forces of this or that country depends on the specific training and combat-training aircraft used. Consequently, the developed capitalistic countries are oriented toward the use of aircraft which they develop and produce. According to their purpose, foreign specialists divide all training aircraft into aircraft for beginning, basic and advanced flight training. Several types of aircraft support training in two, and sometimes in all three pilot training phases. Additionally, there are specialized aircraft for navigation and pilot training, allowing the flight crews to train as radioelectronic equipment specialties during basic and advanced training. These aircraft are not equipped to employ weapons, as are several two-engine trainers, whose main purpose is to support flight training for multi-engine aircraft.

In dividing training aircraft into training and combat training aircraft, foreign military specialists base their main distinction on the fact that the typical training aircraft are not equipped with weapons suspension hard points and the means to use them. If necessary, appropriate variants of these aircraft can be developed, which are practically the same as training aircraft outwardly, but having reinforced structures in the hardpoint area for weapon suspension or some other kind of load. It is actually considered that all training aircraft, equipped for the suspension of additional fuel tanks, may also employ weapons.

Two-seat variants of combat aircraft are used primarily for improving pilot flight and combat training in on-line units, and their entry into service after graduating from the training institutions. Currently, two-seat variants of almost all modern tactical fighters exist abroad, especially of the American F-15 EAGLE, F-16 FIGHTING FALCON, and the F-5 FREEDOM FIGHTER, the French MIRAGE-3 AND MIRAGE F-1. Additionally, gliders and monoplanes are used for pilot training in the training institutions of several countries (for example, in the U.S. Air Force Academy).

As with all aviation equipment, training aircraft are being improved continuously. In the 1950s, the first postwar-generation training aircraft, equipped with piston engines, were developed in the main capitalistic countries. The T-34 (for primary flight training) and the T-28 (for basic flight training) were such aircraft in the U.S. In Great Britain, correspondingly, there was the CHIPMUNK and PROVOST, and in France the NORTH-3202 AND M-S-733. Their maximum flight speed did not exceed 600 km/h, the sea level climb rate was less than 6 m/sec, and the power-to-weight ratio with maximum take-off weight was less than 0.25 hp/kg. Specialized aircraft for advanced flight training did not exist during this period.

Second postwar-generation training aircraft appeared abroad in the 1960s, connected with the development and mass introduction of jet engines and the necessity to raise the level of training aircraft flight characteristics and capabilites. This was the generation of jet and turboprop training aircraft for beginning and basic flight training, and also specialized aircraft for advanced training, the first of which was the American T-33 (developed in 1959). Sometime later, the T-37 (for beginning and basic flight training) and the T-38 (for advanced training) were developed in the U.S., and the JET PROVOST (for beginning and basic training) and the HAWK (for basic and advanced training) in Great Britain, and the CM-170 MAGISTER (for basic training) in France. The T-38 aircraft was the first supersonic training aircraft (flight speed 1,320 km/hr at 11,000 m altitude, climb rate at sea level of more than 150 m/sec). Other training aircraft had a maximum flight speed of 700-1,000 km/hr and a climb rate of 15-18 to 47 m/sec. Their thrust-to-weight ratio greatly increased, reaching almost 0.6 (as with the T-38).

Judging by foreign press reports, there is not complete unity of opinion among Western military experts as to what missions a modern training aircraft must be able to execute. The discussion on this issue acquired urgent acuteness in the first half of the 1980s, when the problem of replacing the main fleet of training aircraft arose, the majority of which still did not meet modern requirements and additionally, were at the end of their flying life. The growing cost of training pilots and the emergence of new countries which produce training aircraft in the world markets (for example, Brazil and Argentina), presenting serious competition to the leading capitalist countries, also came to play an important role.

Currently, a number of foreign countries' specialists are still working out the requirements for a new generation of training aircraft, for which the level of the most important flight characterisitcs (information on several of these requirements are presented below) are specified.

THE U.S. AIR FORCE REQUIREMENTS FOR A NEW-GENERATION TRAINING AIRCRAFT

Flight cruise speed at 7600 meters altitude, km/hr.....550
Maximum flight altitude and cruise speed, m.....more than 10,700
Climb rate at 7600 m, m/sec.....10.1
Net sustained load at 7600 m.....2.5
Landing approach speed, km/hr.....170-200
Landing distance, m.....not more than 1,520
Minimum required runway length, m.....not more than 1,520

BRITISH AIR FORCE REQUIREMENTS FOR A NEW-GENERATION TRAINING AIRCRAFT AST.412

Purpose.....basic flight training
Replaced aircraft in the flight training system.....JET PROVOST
Estimated amount of flight training
per aircraft, hr.....140
Cockpit.....single seat with the HAWK T-1'S cockpit
External suspensions..... expected underwing
Type of engine power plant..... TRDD or TVD
Flight speed, km/hr;
Maximum.....500
Maximum during a long flight
at low altitudes.....390
Cruise at 600 meters altitude.....310
With extended landing gear or flaps...not less than 280
Breakway speed, km/hr..... not more than 110
Achieved speed with a side wind
during take-off, m/sec.....not less than 12.9
Speed with a parachute landing, m/sec.....not less than 3.97
Service ceiling
with maximum weight take-off, m.....not less than 7,600
Time to climb to 4,600 meters
with a maximum weight take-off, min.....7
Time to descend from 4,600 m altitude to 600 m
(flight speed 315 km/hr) with
braking until landing speed (diving
angle not more than 15 degrees), min....not more than 4
Take-off and landing distance on a dry runway
with a hard surface,.....not more than 610
Estimated power plant's operational time
with loads from 0 to -3, sec.....not less than 60
Estimated maximum glider load
Positive.....6
Negative.....3

At the same time, it should be noted that there is a lot written in the Western press and they are praising in every way the successes in the realm of standardizing weapons and military equipment within NATO's framework. However, the reality is not entirely in keeping with such a conclusion, which became very clear during the selection of a new generation of training type aircraft. As one foreign reviewer graphically noted, in analyzing the requirements for such an aircraft in the U.S., Great Britain, France and Italy, the four air forces had four conclusions. Differences of opinion exist, especially regarding the selection of the power plant, main flight characteristic, the reduction in training time and the application of the "cost/effectiveness" criterion.

THE POWER PLANT. Military aviation specialists of the leading capitalistic countries are confronting the issue of what engine to use: a piston engine (PD), a turboprop engine (TVD), a double-ducted turbojet (TRDD) or a turbojet engine (TRD). It is considered, that in the basic flight training phase, cadets must learn firm aircraft piloting skills in day and nightime conditions, aerobatics and group fly-aways, and also be trained for the transition to the advanced flight training phase.

The opponents of light and relatively simple training aircraft with piston engines affirm, that they are less preferable from a "cost/effectiveness" criterion, since longer pilot training is required in this case before they are ready to transition to the next phase of advanced flight training. Additionally, they put forth other objections. According to individual Western experts' opinions, flights in modern fighters (F-16 type), with high supersonic speeds, require the pilot to skillfully withstand high work loads. Therefore, they doubt that appropriate training loads can be created in piston training aircraft. At the same time, they think that such aircraft are ideal for primary and wholly suitable for basic flight training in those countries' air forces where the armament consists of less complex combat aircraft. A second objection is that in many countries with a high density of air traffic, training flights (even in the basic flight training phase) are completed at altitudes of more than 3,000 m. It is considered, that in winter conditions in Western Europe, training flights at altitudes of 600-3,500 meters are often impossible. Stemming from these considerations, the U.S. Air Force selected 7,600 m as the base altitude for assessing the flight characteristic requirements of new-generation training aircraft. The British Air Force selected the altitude range from 6,100-4,500 meters, within the limits of which the aircraft must execute an entire set of aerobatics.

The necessary sea-level climb rate is determined by the power plant, which, for training aircraft with turboprob engines, is more thatn 10 m/sec, and for double-ducted turbojet engines, not less than 17.8 m/sec. For example, the Italian MB-339 turbojet aircraft provides a climb rate of 33.6 m/sec. At an altitude of 3,000 m, the climb rate of better foreign training piston aircraft is reduced to 5.6 m/sec, and the time to climb to this altitude is 7-10 minutes. Turboprop aircraft climb to 6,000 m altitude in 11-16 minutes.

Western experts do no consider that the maximum flight speed of a training aircraft for basic flight training is a determining characteristic. However, at the same time, it is noted that the greater the maximum speed, the wider is

the accomodated range of flight speeds and the more capabilities there are to enhance cadet flight training in this training phase.

Inspite of the fact that turboprob aircraft are giving way to double-ducted turbojet aircraft with respect to speed characteristics and several other properties. For the "cost/effectiveness" criterion, preference is given to them in may countries. The issue regarding the advisability of using a single aircraft for basic and advanced flight training is also being discussed. The proponents for analyzing the "cost/effectiveness" criterion consider, that the operational costs in this case will be substantially higher, rather than more economical, and additionally, the capabilities of a complex aircraft in the basic flight training phase are not being fully utilized.

THE MAIN CHARACTERISTICS. Tactical-technical information of the most extensively deployed training and combat-training aircraft of the capitalistic countries' air forces, compiled from foreign press materials, are presented in the table. It is considered, that depending upon the type of power plant, the aircraft for basic flight training must satisfy the usual take-off and landing requirements, execute all aerobatics, have stable stall and spin characteristics, and meet the standard procedural requirements for exiting from these modes. All the more attention is being paid to human engineering, in particular, the arrangement of instruments and other cockpit equipment, which to a great extent impacts on flight safely.

A good view from the cabin is especially important in crowded airspace conditions. Modern non-prop training aircraft provide a trainee with a forward view 12-15 degrees below the horizon. With a tandem crew arrangement, the back seat is usually elevated so that the instructor has a view forward up to 5 degrees below the horizon.

Judging by Western expert's announcements, at first glance, currently a great deal of importance is being attached to the simple requirement of the cockpit's air conditioning and heating system effectiveness since flights are regulary carried out at altitudes of more than 6,000 m. This requirement is especially important for instructors, who have a flying load of four or more flights a day.

Training aircraft electronic equipment must permit instrument flights, including maintaining the spacial position during flight in cloud cover, and in several countries, in air traffic control zones. The specific variations of equipping aircraft with electronic equipment depends on national requirements and the deployed ground radio-technical systems. A majority of foreign specialists consider that aircraft for basic and advanced flight training must have identical electronic equipment, since this provides unification and facilitates the transition to the advanced flight training phase.

CREW ACCOMMODATION IN THE COCKPIT AND SEAT TYPES. All modern foreign jet training aircraft are equipped with ejection type seats. Their arrangement in a row in the aircraft cockpit for basic flight training is preferred so the that instructor can satisfactorily observe the trainee's actions, who also feels more confident, sitting near the instructor. However, in the West there are opponents of such a seating arrangement, since a wider cockpit is

TACTICAL-TECHNICAL CHARACTERISTICS OF TRAINING AND COMBAT TRAINING AIRCRAFT OF CAPITALISTIC COUNTRIES' AIR FORCES

Designation (Firm) and Name, Developing Country	Weight, kg: Maximum Take-off (Clean) / Number, Type Engines x Thrust, kg or Power, hp	Maximum Speed, km/hr / (At Altitude, m)	Ferry Distance, km / Operational Radius, km(1)	Dimensions: Length x Height x Wing Span, m / Wing Surface, m^2	Armament or Field Load (Maximum Weight, kg) Other Information
1	2	3	4	5	6
AIRCRAFT FOR PRIMARY FLIGHT TRAINING					
T-46A, U.S.	3,100 (2,350) / 2 TRDD x 600	740 (10,700) / 14,300 (22.7)	2,240 / --	8.99x3.04x11.78 / 14.95	It is planned to develop the AT-46 combat training aircraft for export on its basis.
T-41B, MESCALERO, U.S.	1,120 (640) / 1 PD x 210	250 (0) / 5,200 (4.5)	1,630 / --	11.51x3.55x11.85 / 22.02	Military variant of Cessna 172. Can transport two people.
T-34A MENTOR, U.S.	1,340 (980) / 1 PD x 225	300 (0) / 5,550 (5.6)	1,160 / --	7.91x2.92x10 / 16.49	
T-33A SHOOTING STAR, U.S.	5,900 (3,600) / 1 TRD x 2,100	970 (0) / 14,500(16.4)	2,170 / 700	11.51x3.55x 11.85 / 22.02	2 x 12.7-mm machine guns.
T-28D TROYAN, U.S.	5,480 (3,300) / 1 PD x 1,300	570 (1,200) / (1.9)	1,820(2) / --	10.03x3.8x12.38 / 25.2	2 x 12.7-mm machine guns (140).
T-6G TEXAN, U.S.	2,550 (1,940) / 1 PD x 550	340 (1500) / 7,300 (8.3)	1,400(2) /	8.99x3.56x12.8 / 23.56	In the Spanish Air Force its designation is L-16, and in several other countries, ARDVARK.
L-19E (O-1E) BIRD DOG, U.S.	1,090 (680) / 1 PD x 210	185 (0) / 5,600 (5.8)	850(2) / --	7.9x2.23x10.9 / 16.16	Built in Italy for license under the designation, SM-1019
L-18 (PA-18) U.S.	790 (420) / 1 PD x 150	210 (0) / 5,800 (4.9)	740(2) / --	6.86x2.03x10.76 / 16.6	
SKYFOX, U.S.	6,350 (3,860) / 2 TRDD x 1,680	940 (0) / 9,500 (25.4)	4,170(2) / --	14.02x3.76x11.84 / 22.22	Developed on the basis of the T-33 for export.

1	2	3	4	5	6
CESSNA, 182 SKYLINE, U.S.	1,400 (790) 1 PD x 230	270 (0) 5,400 (4.5)	1,870 --	8.54x2.84x11 16.2	Can transport 2 people.
CESSNA, 172 SKYHAWK, U.S.	1,090 (660) 1 PD x 160	230 (0) 4,000 (3.6)	820 --	8.21x2.68x10.93 16.2	Can transport 2 people.
CESSNA, 150F U.S.	730 (440) 1 PD x 100	200 (0) 3,860 (.)	900(?) --	7.24x2.67X10 14.6	
BULLDOG, T-1 GREAT BRITAIN	1,070 (650) 1 PD x 200	240 (0) 4,900 (5.3)	1,000 --	7.1x2.28x10.06 16.2	The export variants have the designation BULLDOG-102, -103, -120, -126, -127; SK-61
JET PROVOST, T-5A, GREAT BRITAIN	4,170 (2,490) 1 TRD x 1,130	710 (7,600) 10,500 (18)	1,450 --	10.27x3.1x10.77 19.8	
NDN-1 FIRECRACKER GREAT BRITAIN	1,290 (880) 1 PD x 260	330 (0) 5,500 (7.36)	2,260 --	7.7x3x7.9 11.7	
NDN-1T TURBO FIRECRACKER GREAT BRITAIN	1,820 (1,120) 1 TVD x 550	490 (.) 8,400 (12.1)	1,220(2) --	7.7x3x7.9 11.7	The export variant of the NDN-1 aircraft.
CHIPMUNK, CANADA	950 (650) 1 PD x 145	220 (0) 4,800 (4.3)	780 --	7.75x2.13x10.47 16.1	
CT-134A MUSKATEER-2, CANADA	1,100 (680) 1 PD x 180	240 (0) 3,800 (3.6)	1,200(2) --	7.85x2.51x9.98 13.6	Can transport 2 people
TB-30 EPSILON, FRANCE	1,250 (930) 1 PD x 300	380 (0) 7,000 (9.4)	1,300 --	7.59x2.66x7.92 9	Armaments (300) can be suspended on the export variant.
CAP-10B, FRANCE	830 (540) 1 PD x 180	270 (0) 5,000 (6)	1,200(2) --	7.16x2.55x8.06 10.85	

1	2	3	4	5	6
MICROJET MJ-2000B, FRANCE	1,150 (650) 2 TRD x 130	640 (0) 9,150 (8.6)	860 -	6.56x2.07x7.63 6.12	Intended for export. It is planned to develop a combat variant with a 20-mm cannon.
R-235 GUERRIER, FRANCE	1,300 (725) 1 PD x 260	280 (0) 4,500 (5)	1000(2) --	7.23x2.81x9.73 12.76	Export variant. It has 4 underwing hardpoints for external suspensions (340)
M.S. 760A PARIS-1, FRANCE	3,470 (1,940) 2 TRD x 400	650 (0) 10,000 (12.5)	1,500 --	10.24x2.69x10.13 18	Can be used for weapons employment training.
M.S. 760B FRANCE,	3,920 (2,070) 2 TRD x 480	700 (7,600) 12,000 (12)	1,740(2) --	10.24x2.69x10.13 18	Can be used for photo aerial reconnaissance
SF-260M, ITALY	1,200 (800) 1 PD x 260	330 (0) 4,660 (8.9)	1,650(2) --	7.2x2.41x8.35 10.1	
SF-260TP, ITALY	1,300 (800) 1 TVD x 350	420 (3,000) 8,500 (11)	3,100 150	7.4x3.5x8.4 10.1	Can be used as a light ground attack plane (300)
P.149D, ITALY	1,680 (1,160) 1 PD x 270	300 (0) 6,000 (5)	1,100(2) --	8.8x2.9x11.12 18.8	Can be used as a light transport aircraft for carrying 2-3 people.
C.22J, ITALY	2,800 (1,420) 1 TRD x 1,000	670 (0) 12,200 (9.2)	2,000(2) --	9.3x3.7x8 12.6	Can be used as a light ground attack plane (600)
FANTRAINER-400, FRG	1,600 (1,000) 1 TVD x 420	425 (0) 6,100 (10.7)	1,760(2) --	9.23x3x9.7 13.9	
FLAMINGO-1-1, FRG	1,050 (700) 1 PD x 210	280 (4600) 6,700 (6.2)	900(2) --	7.6x2.7x8. 11.5	
BU-131, SPAIN/FRG	720 (450) 1 PD x 125	200 (0) 5,400 (5.2)	500 --	6.7x2.3x7.4 13.5	
AS-202/18A BRAVO, SWITZERLAND	1,050 (630) 1 PD x 180	240 (0) 4,300 (4.6)	960 --	7.5x2.81x9.75 13.86	NAR, practice bombs for 6 underwing hardpoints.
AS-202/26A BRAVO SWITZERLAND	1,200 (800) 1 PD x 260	380 (0) 5,700 (.)	850(2) --	7.5x2.81x9.75 13.86	NAR, practice bombs (195).

1	2	3	4	5	6
AS-32T TURBO-TRAINER, SWITZERLAND	1,900 (800) 1 TVD x 320	350 (0) 10,500 (12.6)	1,440(2) --	9.3x3.4x9.7 14.1	Being developed on the basis of the AS-202. Has 5 hard points for external suspensions (600)
P-3, SWITZERLAND	1,530 (1,190) 1 PD x 240	310 (0) 5,000 (7)	750	8.75x3.05x10.4 16.5	1X7.62-mm machine gun (in a pod) and 2x50.8mm NAR or 4x12 kg practice bombs.
SUPPORTER SWEDEN	1,200 (650) 1 PD x 200	240 (0) 5,200 (4.8)	930(?) --	7x2.6x8.9 11.9	Export aircraft. In Denmark its designation is is T-17, built under license in Pakistan under name MASHSHAK. The variant without weapons is designated SAFARI.
SK-50C (SAAB-91D), SWEDEN	1,200 (710) 1 PD x 180	260 (0) 5,000 (4.1)	1,060 --	8.03x2.2x10.6 13.6	
SK-60 (SAAB-105) SWEDEN	4,500 (2,510) 2 TRDD x 740	770 (6,000) 12,700 (17.5)	1,940 315	1.05x2.7x9.5 16.3	Has 6 hardpoints for external weapons SUSPENSIONS (750). Variants: SK-60A-trainer, SK-60B-combat trainer, SK-60C tactical aerial reconnaissance.
SAAB-105XT SWEDEN	6,500 (2,550) 2 TRD x 1,290	970 (.) --	2,400 --	10.5x2.7x9.5 16.3	Bombs, NAR (2000)
T-3 (KM-2B), JAPAN	1,540 (1,130) 1 PD x 340	380 (5,000) 8,200 (7.7)	1,000 --	8.04x3.02x2.10 16.49	Developed on the basis of the American T-34 MENTOR aircraft.
T-17, BRAZIL	860 (560) 1 PD x 160	240 (0) 4,500 (4.60	800(2) --	7x2.7x9 13.8	
T-23, (A-122A) BRAZIL	1,830 (1,190) 1 PD x 160	220 (0) 4,500 (4.3)	800(2) --	6x2.7x8.5 13.5	
T-CH-1, TAIWAN	5,060 (2,610) 1 TVD x 1,450	590(4,600) 9,800 (17.3)	2,010(2) --	10.26x3.66x12,19 25.2	Developed on the basis of the American T-28 aircraft.
PL-1B, TAIWAN	650 (430) 1 PD x 150	240 (0) 5,500 (8.13)	650 --	5.99x2.24x8.53 10.78	
AIR-TRAINER, CT-4 NEW ZEALAND	1,090 (680) 1 PD x 210	290 (0) 5,500 (6.8)	1,270 --	7.06x2.59x7.92 11.98	7.62-mm machine gun NAR, bombs (230)

1	2	3	4	5	6
BU-181 MK6 GUMHYRIA, EGYPT/FRG	840 (520) 1 PD x 300	220 (0) 4,800 (4)	960 --	7.9x2.1x10.6 13.5	

AIRCRAFT FOR BASIC FLIGHT TRAINING

T-34C TURBO-MENTOR, U.S.	1,950 (1,430) 1 TVD x 400	410 (1,600) 9,150 (7.5)	1,470 185-555	8.75x3.02x10.2 16.7	NAR, bombs, cannon (containerized) on 4 underwing hard point suspensions (620).
T-34C-1, U.S.	2,490 (1,350) 1 TVD x 550	430 (.) 9,150 (11)	1,400(2) 185-555	8.75x2.9x10.2 16.7	Export variant. Can carry various armament (820)
T-37B TWEET (CESSNA 318), U.S.	2,980 (1,730) 2 TRD x 465	690 (6,100) 11,800 (15.4)	2,130 --	8.93x2.85x10.3 17.09	
T-39A SABERLINER, U.S.	9,000 (5,000) 2 TRD x 1,500	910 (6,600) 13,700 (23.9)	3,400(2) --	14.73x4.88x13.54 31.8	Intended for combat training pilots of units being formed. Can carry 10 people.
T-42, COCHISE U.S.	2,310 (1,390) 2 PD x 269	390 (0) 6,000 (8.5)	1,970 --	8.31x2.92x11.53 18.5	
BONANZA F-33A, U.S.	1,540 (960) 1 PD x 285	340 (0) 5,440 (5.9)	1,650 --	8.14x2.5x10.22 16.83	Intended for training pilots of military transport aviation.
C-12F, U.S.	5,770 (3,420) 2 TRD x 850	550 (7,600) 10,700 (12.4)	3,760 .	13.34x4.57x16.61 28.15	
S-2A U.S.	680 (450) 1 PD x 200	260 (0) 6100 (9.7)	610(2) --	5.41x1.94x6.1 11.6	
HAWK T-1, GREAT BRITAIN	7,760 (3,650) 1 TRDD x?,420	1,000 (0) 14,600 (47.2)	3,150 560-1040	11.85x4x9.39 16.69	30mm cannon (in a pod), NAR, bombs (1360). Export variant has the designation HAWK T-51, T-52 and T-53.
VAMPIRE T-11, GREAT BRITAIN	5,860 (3,350) 1 TRD x 1,590	870 (0) 12,200 (22.8)	1,370 --	10.51x2.23x11.59 24.25	Export variant has the designation VAMPIRE T-55, and T-55, and can be armed with a 30-mm cannon (670).

1	2	3	4	5	6
JETSTREAM T-1, GREAT BRITAIN	5,680 (3970)	460 (3,700)	2,170	14.36x5.32x15.85	Intended for training military transport aviation pilots.
	2 TVD x 1,000	8,000 (12.7)	--	25.08	
STRIKE-MASTER, 167, GREAT BRITAIN	5,220 (2,650)	760 (6,100)	2,600	10.27x3.1x10.77	Has 8 hard points for external suspensions (1360). (1360). Developed for export on the basis of the JET PROVOST T-5.
	1 TRD x 1,550	12,200 (26)	230-400	19.8	
T-67M FIREFLY 160, GREAT BRITAIN	910 (580)	230 (0)	660	7x2.4x10.6	
	1 PD x 160	4,600 (20)	--	12.6	
CT-114 TUTOR (CL-41A) CANADA	3,360 (2,210)	800 (8,700)	2,160	9.75x2.84x11.13	The export variant has the designation CL-41C TUTOR TUTOR (in Malaysia the TURBAN), and 6 hardpoints for the suspension of bombs and NAR (1590).
	1 TRD x 1,200	13,100 (21.4)	--	20.41	
ALPHA JET FRANCE/ FRG	8,000 (3,500)	1,000 (0)	4,000	13.23x4.19x9.11	27 or 30-mm cannon, NAR, bombs, MAVERICK or MAGIC guided missiles (2500).
	2 TRDD x 1,350	14,630 (57)	430-1370	17.5	
CM-170 MAGISTER, FRANCE	3,100 (2,150)	720 (9,100)	1,180	10.2x2.8x11.3	
	2 TRD x 400	11,000 (15)	--	17.15	
CM.170-2 SUPER MAGISTER, FRANCE	3,260 (2,310)	750 (9,100)	1,250	10x2.8x12.15	
	2 TRD x 480	12,000 (18)	--	17.3	
FUGA-90, FRANCE	4,500 (2,550)	700 (9,100)	2,580(2)	11.1x2.7x12	The armament can be accomodated on 4 under-wing and 2 wingtip hardpoints (1100).
	2 TRDD x 790	13,100 (24.2)	--	18.6	
MB-326G, ITALY	4,580 (2,690)	840 (6,100)	2,450	10.65x3.72x10.15	Bombs, NAR, (1815). Being built under license in Brazil (AT-26) and Republic of South Africa (RSA) (IMPALA-1). In African countries it has the designation 326GB, in Australia-326H.
	1 TRD x 1,550	11,900 (31.5)	130-650	19.35	
MB-339A, ITALY	5,900 (3,220)	900 (0)	2,100	10.97x4x10.86	Cannons or machine guns (pod-contained), MAGIC or SIDEWINDER guided missiles (1800).
	1 TRD x 1,820	14,600 (33.5)	390 590	19.3	
S-211, ITALY	3,100 (1,620)	740 (0)	2,700	9.31x3.6x8.43	Cannons or machine guns (pod-contained), bombs, NAR (600).
	1 TRDD x 1,130	12,200 (25.2)	230-560	12.6	

1	2	3	4	5	6
P-148, ITALY	1,200 (880)	230 (0)	920(2)	8.44x2.39x11.11	Intended for training auxillary aviation pilots.
	1 PD x 190	5,000 (4.6)	--	18.84	
P-166M, ITALY	3,680 (2,350)	360 (2,900)	1,930(2)	11.9x5x14.25	Intended for training military transport aviation pilots. It can transport up to 10 people. It has the designation ALBATROSS in the RSA.
	2 PD x 340	7,800 (6.3)	--	26.56	
PC-7, TURBO-TRAINER SWITZERLAND	2,700 (1,330)	410 (3,100)	1,350	9.78x3.21x10.4	Has 6 hardpoints for external suspensions (1000).
	1 TVD x 550	9,450 (11)	--	16.6	
PC-9, SWITZERLAND	3,200 (1,690)	560 (6,100)	3,700	10.5x3.26x10.12	Has 6 hardpoints for external suspensions (1000) (1000).
	1 TVD x 950	11,600 (20.3)	--	16.29	
E-25 (C-101) AVIAJET SPAIN	5,600 (3,350)	770 (8,500)	3,800	12,25x4,25x10.6	Armament is accomodated in a fuselage compartment and on 6 underwing suspension hardpoints. It is being produced under license in Chile under the designation T-36 HALCON.
	1 TRDD x 1,590	12,500 (17)	185-830	20	
AE-10B (HA-200D) SIETTA, SPAIN	3,460 (1,920)	650 (7,000)	1,500	8.97x2.85x10.93	Training variant has the designation E-14A.
	2 TRD x 400	12,000 (17)	--	17.42	
T-4 (KA-850), JAPAN	7,500 (3,700)	1,000 (7,600)	1,670	13x4.6x9.9	Being developed to replace the T-33A and T-1A and B.
	2 TRDD x 1,660	13,700 (50)	--	21.6	
T-1A, HATSUTAKA JAPAN	4,990 (2,760)	930 (6,100)	1,950	12.12x4.07x10.5	12.7mm cannon, bombs, NAR, SIDEWINDER guided missile missile (680).
	1 TRD x 1,810	14,000 (33)	--	21.22	
T-27 TUCANO (EMB-312), BRAZIL	3,180 (1,810)	480 (4,100)	3,330	9.86x3.4x11.14	Machine guns, bombs, NAR, (1000)
	1 TVD x 750	9,950 (10.8)	260-970	19.4	
EMB-121, NINGU, BRAZIL	5,670 (3,500)	450 (3,400)	2,350(2)	12.25x4.71x14.45	Used for training multiengine pilots. Can carry 6 people.
	2 TVD x 680	7,900 (7.1)	--	27.5	
IA-63 PAMPA, ARGENTINA	4,650 (2,180)	740 (0)	1,500(2)	10.9x4.3x9.7	
	1 TVD x 1,600	12,900 (27)	--	15.6	

1	2	3	4	5	6
T-35 PILLAN, CHILE	1,320 (830) 1 PD x 300	310 (0) 5,800 (7.8)	1,330(2) --	7.96x2.34x8.81 13.64	Developed on the basis of the American Cherokee Arrow aircraft.
AT-TC-3 (AT-3), TAIWAN	7,490 (3,860) 2 TRDD x 1,590	900 (0) 14,600 (40.7)	2,040(2) --	12.9x4.36x10.46 21.93	Has 5 hardpoints for external suspensions (2500).
AIRCRAFT FOR ADVANCED FLIGHT TRAINING					
T 38A TALON U.S.	5,900 (3,460) 2 TRD x 750	1,320 (11,000) 16,300 (152.4)	2,130 --	14.13x3.92x7.7 15.8	
T-2E BECAY U.S.	7,030 (3,750) 2 TRD x 1,340	850 (7,600) --	1,720(2) --	11.67x4.51x11.62 23.7	Has 6 hardpoints for external suspensions (1590).
FANTRAINER 600, FRG	2,300 (1,060) 1 TVD x 650	430 (3,000) 7,600 (16)	1,390(2) --	9.23x3x9.7 13.9	
T-2A, JAPAN	12,800 (6,200) 2 TRDD x 3,310	1,700 (11,000) 15,200 (178)	2,870 350-550	17.86x4.45x7.88 21.18	20-mm cannon, air-to-air and air-to-ground guided missiles, and bombs (2700).
RTAF-5, TAIWAN	2,090 (1,650) 1 TVD x 420	390 (0) 6,100 (7.6)	8702 --	8.76x3.05x9.55 15.66	Under development. Has 4 underwing hardpoints for external suspensions.
T-25 UNIVERSAL BRAZIL	1,700 (1,100) 1 PD x 300	310 (1,500) 5,000 (5.3)	1,000 --	8.6x3.1x11 17	
T-25B UNIVERSAL-2 BRAZIL	1,900 (1,150) 1 PD x 400	320 (.) 5,000 (9)	520 --	8.8x3.4x11 17.2	
AIRCRAFT FOR NAVIGATION AND PILOTING TRAINING					
T-43A, U.S.	52,400 (31,050) 2 TRDD x 6,580	930 (7000) -	5,200 --	30.48x11.28x28.35 91.05	Maximum flight time of 6 hrs. It has 19 panels (16 for the trainees and 3 for the instructors.
BEECH C-99 AIRLINER, U.S.	5,130 (2,950) 2 TVD x 715	500 (2,400) 8,600 (11.3)	1,690 --	13.58x4.37x13.98 26	Can transport up to 15 people

1	2	3	4	5	6
DOMINI T-1 (HS-125), GREAT BRITAIN	9,620 (5,170)	800 (9,100)	2,740	14.45x5.03x214.33	Intended for training navigators and navigation equipment operators. One instructor simultaneously trains 2-3 people.
	2 TRD X 1,360	12,200 (20.3)	--	32.8	
PD-808, ITALY	8,170 (4,830)	850 (6,000)	2,130	12.8x4,8x13.2	Simultaneously trains 2-3 people. Can transport 9 people (730).
	2 TRD x 1,520	13,700 (27.5)	--	20.9	
C-212 AVIACAR SPAIN	7,300 (4,120)	360 (4,000)	1,720	15.2x6.3x19	Military transport aircraft. Used for navigation and pilot training.
	2 TVD x 850	8,500 (8.6)	--	40	
FTB-337G, FRANCE	2,100 (1,450)	380 (0)	2,130	9.07x2.84x12.1	Developed on the basis of the American Cessna 337 aircraft (in the U.S. Air Force it has the designation O-2).
	2 PD x 225	7,300 (6.3)	--	18.8	
FALCON-ST FRANCE	13,000 (7,350)	860 (7,600)	3,300	17.2x5.32x16.3	Used for training MIRAGE aircraft pilots. It can transport up to 14 people.
	2 TRDD x 2,000	12,800 (.)	--	4	
HFB-320, FRG	9,200 (5,500)	830 (7,600)	2,200	17.5x4.94x14.5	Planned for training REC equipment operators (1800).
	2 TRD x 1,410	12,200 (21.60)	--	30.14	

1. Depending on the payload and flight profile.
2. Flight range, km.

Translator's note: PD=piston engine, TVD=turboprop, TRDD=double-ducted turbojet, TRD=turbojet.

required in this case, which contradicts the requirements of design flexibility. In a majority of the aircraft, the cockpit crew seats are arranged in tandem for advanced flight training.

RATE OF USE. Judging by foreign press reports, Western specialists advocate high usage for training aircraft, which reduces their numbers requirements. For example, the U.S. plans to use the new T-46A training aircraft at a rate of 55 hours per month (an average of four flights during the day and one or more at night). Several countries' air force commands are proposing specific requirements which training aircraft must meet. For example, it must execute two successive flights lasting 1 hour and 20 minutes, without intermediate refueling, and still have fuel supply for a flight of 280 km (a British Air Force requirement) or 550 km (U.S. Air Force). A number of measures enables a training aircraft to be rapidly prepared for a turn-around sortie, including a single-point refueling system and easy access to onboard equipment.

Specifically, it is considered that, a long time between engine servicing and a low frequency of prematurely removing them from a aircraft ensures low operational expenditures for the modern training aircraft fleet. They think, that the service time for training aircraft must be 25 years (8,000 hours flight time, and 10,000 hours for fatigue strength).

TRAINERS IN THE FLIGHT TRAINING SYSTEM. In actively discussing the role of a training aircraft in the flight training system, and the various concepts for selecting an aircraft type and its equipment, foreign military specialists note, that these problems will be more deeply understood if they are analyzed with regard to the development of modern aircraft trainers.

According to foreign press reports, aircraft trainers were already being used actively during the Second World War. Especially in the U.S. more than 10,000 such so-called "blue boxes" (trainers) were produced, providing training for approximately 500,000 pilots. This was not the last reason, that the probabiltiy of an American pilot being shot down on the first sortie averaged approximately 20 per cent, but averaged 40 per cent for fascist German pilots. In analyzing the war experience in Vietnam, American military specialists noted, that the greatest losses of U.S. Air Force pilots occurred in the first 8-10 sorties. Therefore, it was concluded that the use of trainers was important, especially for air combat training and the combat employment of weapons.

The capabilities of aircraft trainers have grown, especially in connection with the development of high-speed computers, situation display equipment, and mathematical support. Modern trainers provide practically real simulation of the combat situation. In particular, the following can be depicted on them: terrain; artificial constructions; visability conditions; the configuration and movement of air, ground and sea targets; enemy activities, including the use of EW systems; and the effect of weapons employment.

At the same time, Western experts repeatedly underscore, that they consider aircraft trainers to be suplementary, and not the replacement for actual pilot training in the air. At the same time, trainers provide training for such situations, as are practically impossible during actual flights or those presenting great risk (for example, training at the limits of an aircraft's capabilities, in conditions of simulating the evasion from an enemy guided missile, during the failure of a four engine aircraft's two left or right engines, etc.). For example, the WST (Weapon System Trainer) developed in the U.S. for the B-52 bomber, allows flight at altitudes less than 120 m (these aircraft usually do not fly at these altitudes), and the radar situation over enemy territory to be simulated. One of the typical missions, which is worked out on the WST is the bomber's take-off, the climb to altitude, a flight at high altitudes, in-flight refueling from a KC-10 or KC-135 tanker, a descent to low altitudes with a launch of a cruise missile and SRAM guided missiles, a bombing run, climb to altitude and a landing at a dispersal airfield. The length of the simulation flight is 4 hours, or approximately half the time of an actual aircraft flight (8-9 hours). In this respect, great importance is attached to the use of such trainers, and the Western press testifies to this fact. By the middle of 1985, the U.S. Air Force deployed 11 WSTs and their planned usage rate was 16 hours per day, 6 days a week.

In order to practically assess the employment effectiveness of trainers, a comparative study was conducted in the U.S. Air Force. Two groups of pilots were selected for training in the employment of weapons on the A-10 ground attack aircraft (dive bombing and cannon fire against ground targets with small sighting angles). The pilots of one group went through a combat mission on a trainer three times before the first sortie, and the other group started training immediately on aircraft. As a result, the pilots had the following results on the first sortie. For pilots having preliminary training on the trainer, the bombing run accuracy (CEP) was 20-25 m, and without such training, approximately 35 m. The pilots of the second group achieved the level of results of the first sortie of the pilot group having trainer preparation only after five sorties, but although this was not so significant, all lagged behind (achieved bombing run CEP 18-20 and 25 m respectively). For cannon fire, the number of shells, hitting the target, was (for the same conditions as during the bombing run) 55 and 25 in the first sorties and 55 and 45 in the fifth.

Roughly the same research was conducted as it applied to the execution of a combat mission against tanks. It should be noted, that the number of destroyed tanks per one lost aircraft was approximately 60 per cent greater when the pilots of these aircraft had preliminary training on trainers.

Similar views on the use of aircraft trainers are being expressed in European NATO countries. In France, for example, the GI-1,000 trainer is being developed, which simulates the situation of 100 400x400 km firing ranges in real time. The GI-1,000 trainer is being developed to recreate the conditions for combatting helicopters and tanks. An important realm in using trainers is considered to be their use for assessing the conduct of combat operations tactics, including during combat training.

During active work to develop new training aircraft, leading capitalist countries are transforming pilot training into a large military business matter, and the majority of the already existing training aircraft and those being developed are an important combat aircraft reserve.

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MINE COUNTERMEASURES SHIPS IN NATO NAVIES

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[Article by Capt 1st Rank (Reserve) Yu. Petrov, Capt 2nd Rank B. Tyurin; "Mine Countermeasure Ships in NATO Navies"]

[Text] The Second World War and recent armed conflicts in various areas of the world have shown that mines are a serious threat and a rather effective means of warfare capable of substantively influencing the course of a war at sea. In view of this, the aggressive NATO bloc's politico-military leadership pays a good deal of attention to developing new types of mines, as well as the continuing modernization and development of forces and means of defeating mines including mine countermeasures ships (MCM).

At the beginning of the 1950s, the U.S. and U.K. had already begun to implement the first postwar program to modernize mine force ships. Other countries of the North Atlantic Organization were also constructing minesweepers. In addition, large numbers were transferred from the U.S. and Great Britain. In the first program, over 400 mine force ships of all classes were built. By the end of the 1970s, the majority of them, wooden hulled ones, had reached the end of their service life. In connection with this, at the beginning of the 1970s, design, and then construction was begun on 2nd post-war generation minesweepers, primarily mine sweeper-hunters (MSH), which are discussed below.

This program envisions construction of more than 150 ships, of which, about 60 units will be in commission at the beginning of 1986. The foreign press has turned its attention first to the ships built under the TRIPARTITE program (A common design of France, Belgium and the Netherlands). France is planning for 10 ships and the other countries 15 each. In addition, they are looking at the series of British mine sweeper-hunter of the BRECON-Class (13 units) and SANDOWN-Class (12); U.S. AVENGER-Class (14) and CARDINAL-Class (17); Italian LERICI-Class (12) and FRG Project 332 (20). Basic technical and military characteristics of these new ships (in the fleet and under construction) are shown in the Table.

BASIC CHARACTERISTICS OF MCM SHIPS IN NATO NAVIES

Name - Number in Fleet (Planned to build); Year of Entry Into Fleet; Lead Ship and Country	Full Displacement	Basic Dimensions Length, Beam Draft (m)	Number of Diesels X HP / Cruising Range (at Speed), Mi.	Full Speed / Search Speed	Crew	Search/Destroy Systems (Type of Sonar and Independent Remote control Underwater Equipment	Sweep Type	Armament
AVENGER - 1 (13), 1985, U.S.	1,040	68.3x11.9x3.5	4 X 600 / ...	14 / 4	81	AN/SQQ-30 or 32, MNS	Contact - OROPESA Electromagnetic - MK5, 6, 7 Acoustic - MK4V, 6B	2 127 mm Machineguns
CARDINAL - 0 (17), 1987, U.S.	334	57.6x11.9x0.7	2 X 825 & 2 X 290	20 / up to 12	40	AN/SQQ-30 and 32, MNS	Contact - MK5 Electromagnetic - MK5 Acoustic - PAP 104	Machineguns
BRECON - 8 (6), 1980, U.K.	725	60x10x2.5	2 X 1,800 / 1,500 (12)	16 / up to 8	45	193M, PAP 104	Contact, Electromagnetic, Acoustic	40 mm automatic gun mounts
SUNDOWN - 0 (12), ----, U.K.	500	50X9.5X2.1	2 x 680 / 3,500 (12)	15 / up to 7	40	2093, PAP 104	Contact - OROPESA	--
ERIDAN - 5 (5), 1984, France	544	49.1x8.9x2.5	1 X 1,850 / 3,000 (12)	15 / up to 7	49	DUBM21A, 2 PAP 104	Contact	20 mm automatic
PROJECT 332 - 0 (20), 1991, FRG	400	51x8.8x2.5	2 X -- / --	18 / --	--	PENGUIN B-3	Contact	Close-in AA Weapon System, 40 mm guns
LERICI - 4 (8), 1984, Italy	502	50x9.6x2.6	1 X 1,600 / 2,500 (12)	15 / up to 7	39	AN/SQQ-14 PAP 104 or MNS	Contact	20 mm guns

NATO Naval experts have stated that these modern MSHs fully meet the requirements for mine countermeasure operations in the face of a growing mine threat. In their view, they can no longer be viewed today as second line ships, and they ought to receive priority in shipbuilding programs.

During the first post war program, non-magnetic minesweepers with wooden hulls and reduced noise were built which were designed to sweep contact and non-contact mines. The ongoing program provides for construction of ships equipped with electronic mine search and destruction systems. The most important demands made on them are: a narrow level of physical field, high maneuverability during search and mine destruction as well as shock-resistance and relatively low cost. New mine countermeasures ships incorporate five basic components: a basic minesweeper-hunter, precision navigation system, specialized CIC installations, a sonar system for search and classification of mines and a subsystem for surveillance and destruction.

The project's first order of business was the choice of material for hull construction. Some materials selected were wood, fiberglass (in most cases) and non-magnetic steel (the German Project 332). This stemmed from the following considerations.

Wood is a traditional material with well-known properties. In building the U.S. AVENGER-Class MSH, laminated sheathing was used, with an all-glue laminate framework (stringers are of laminated fir, ribs of laminated oak), which considerably reduced their weight in comparision with hulls manufactured in a normal fashion. Laminated fir is used for the deck framing. The pilot house is constructed of both single- and multi-layered wood, sheathed with plywood, and, as in all external surfaces of the ship, covered with fiberglass for protection against effects of rainfall. The submerged segments are also covered with synthetic materials.

Fiberglass was selected because of its specific properties: non-magnetic, corrosion and erosion resistant, high shock resistance and simple hull manufacturing technology.

Three types of fiberglass are used in building hulls. The first is a single layer, thin walled fiberglass sheet, strengthened throughout with carbon fibers, of longitudinal-transverse preformed framing (ribs to the level of the side keels, stringers below them). Such a hull was chosen for the British SANDOWN-Class mine hunter. The hulls are similar to the French ERIDAN-Class MSH (TRIPARTITE program) and the English BRECON-Class, with single layer sheeting reinforced by longitudianl-transverse fibers. Construction is reinforced by bolted joints. The second type is a hull made of single-layer relatively thin fiberglass sheeting with no framework (like the Italian LERICI-Class MSH). The third is a multilayered, "sandwich" type sheet with no framework, and external fiberglass layers and a core of polyvinyl chloride foam. Similar construction is employed for the Swedish MSH LANDSORT and it is intended that this system be used on the U.S. CARDINAL-Class MSH.

Non-magnetic steel for the hull of those mine force ships programmed for construciton in the FRG Navy was selected because of its successful use in project 206 submarines and its well-developed manufacturing technology. The

hull is of all-welded construction, with 4-6-mm thick ribs along a close gridwork (spacing length of 1,000 mm, distance between girders, 300 mm). It is noted that non-magnetic steel, in contrast to wood and fiberglass, has requisite strength. It does not require electromagnetic shielding of the combat information center, radiotransmitter roonm, etc., and insulating of electric cable and grounding of electric equipment are alleviated. During shock trials, the maximum amount of deflection of the ribs of the steel hull was 25 mm, and on hulls made of laminated "sandwich" type ribs, the greatest was 140 mm, which has a favorable affect on shaft alignment and for firecontrol system operation. Steel hulls present less difficulty during modernization and conversion. Taking the weight of a steel hull as one unit, then wooden ones would be heavier by a factor of 1.06, single-layered fiberglass by 1.3, and laminated fiberglass would be lighter by a factor of 1.15. The limits of yield and strength of the selected type of steel are 43.5 and 75-94 kg/mm^2 respectively.

The majority of MSHs have a long forecastle which extends far into the stern, a built-up superstructure with smokestacks adjacent to it, (the CARDINAL-Class has two stacks located symetrically along the sides). SANDOWN-Class ships are projected as flush deck hulls. For the first time in foreign shipbuilding practice, the U.S. ordered a CARDINAL-Class MCM air cushion ship with rigid side fairwaters (skegs), which will have a reduced acoustic and magnetic field and higher shock resistance.

In the stern of the MSHs is a trawl and a davits (for release and recovery of the remotely guided underwater mine search, mine laying and mine recovery equipment), hoists and reels for the contact, magnetic and acoustic trawls, and the underwater equipment as well. Watertight bulkheads are distributed along the length of the hull for the 6-10 compartments. The ship will remain afloat if two adjacent compartments are flooded. Many MCM ships are equipped with stabilization systems of tanks and side thrusters to increase the effectiveness of their trawl (search). Such systems reduce heel angel by a factor of 1.5-2.

Some of the internal compartments, including the wheelhouse, are equipped with air conditioned and filters and an excess pressure is maintained in them. Many ships have the means to erect a water screen.

Propulsion equipment is mounted, as a rule, on "isolated mounts" to increase shockproofing, which results in a simultaneous redution of vibration and noise levels. It is noted that in the LERICI-Class MSHs, the fuel and oil tanks are also placed on mountings fully "isolated" from the hull.

In foreign specialists' opinion, the character of MSH's combat operations drives the design of the power plant along the following basic requirements: a low physical field, primarily acoustic and magnetic; high shock resistance; high maneuverability at low speeds; and the capability to keep the ship at a given point. Shipbuilders' experience points out that diesel plants in a 1-4 engine configuation, driving fixed or variable pitch propellers in conjunction with slow speed settings meet these requirements. In a single case (on the SANDOWN-Class MSH) it was decided to install finned propellers to be driven by the diesels. The choice of variable pitch screws is explained by the need to

eliminate a reversing gear from the power plant, thus reducing its weight and noise, and simplifying its use. In addition, the variable pitch propeller, when the blades are rotated into neutral plane, reduces resistance to whip movement when working with slow speed settings. Because, among other types of propulsion systems, preference was given to diesels, a high economy at practically all load aspects, satisfactory weight-size ratios and relative ease of service were realized. The new MSHs have diesels installed with aggregate power of 600-1,900 hp, and a specific fuel consumption of 140-150 gal/hp/hr, permitting a full speed of 13-18 knots and a cruising range in the vicinity of 1,500-3,500 miles at 12 knots. To achieve the necessary maneuverability during search and for precise station keeping, all new MSHs are equipped with low speed settings, and many of these with bow thrusters. Slow speed settings of an active rudder type are in widespread use (TRIPARTITE program ships) which work as a kind of engine-propeller complex of screws in a nozzle - a submersible motor.

Another type of widespread use slow apeed setting systems are auxiliary diesel or motors, driving, through the hydraulic system, coupling-decoupling clutches and reduction gears, the main propellers (BRECON-Class and AVENGER-Class). A variation of this type of setting is seen on the SANDOWN-Class ships, where the slow speed motors drive the finned propellers through a mechanical transmission (self-synchronizing belt-driven coupling).

The slow speed installation on the LERICI-Class MSH comprises three non-magnetic, low noise, retractable, autonomous screw-propulsion thrusters, two of which are located in the stern section and one in the bow. Their narrow dimensions allow their removal from inside the hull into cylindrical shafts 1.4 m in diameter, thanks to which resistance to ships movement is reduced when working on the main engines. It consists of a retractable stanchion with a 5-bladed nozzle drive propeller, collocated with a hydraulic drive motor on one shaft. Using this motor the ship can rotate around a vertical axis, by changing the vector of the propeller buffer. The hydraulic motor is linked to an intermittently operating pump, permitting a smooth change in frequency and direction of propeller rotation. In all, the system has two 425 hp diesels and two pumps (one backup), each of which drives three hydraulic engines. Control and operation of the system is done remotely from two control posts both by an operator constantly on scene and automatically by means of a computer program.

The CARDINAL-Class ships will have within their slow speed system two hydraulic motors, driving the primary shafts and hydraulic propulsion thrusters, located in a well deck.

The power of the electrical installation on the newer MCM ships related to their slow speed installations, self-guided underwater apparatus, and air conditioning, etc. has grown significantly. As a rule, there is 100 per cent reserve power. In the majority of cases, the ships are equipped with three 200-250 kW diesel generators, providing AC power. The ERIDAN-Class MSH is equipped with gas turbine generators. The light weight of these electrogenerators enables them to be installed above the upper deck in the majority of cases, and for the gas turbine, on the part of the superstructure which reduces noise and increases shock resistance.

To reduce the magnetic field, these ships are equipped with demagnetized equipments. Magnetic field levels are measured with magnetometers which transmit data to central or autonomous (for each coil winding) microprocessors, which regulate the current.

The electrical plant is operated remotely from the wheelhouse, where the automatic system control station is installed (its operation is expected to be in both standard and emergency modes).

Judging from the material in the foreign press, the following requirements are imposed on the MHSs (for example, the French ERIDAN): detect mines at at a depth of 80 m and greater and at a range of over 500 m; classify mines at a slant range of 150 m and when they are located at a depth of at least 60 m; determine the position of mines in off shore zones with a precision of 15 m; destroy bottom mines at depths of 80 m in three knot currents and with winds up to 15.4 m/second; sweep moored mines with a contact sweep at speeds of 8 knots and to find and destroy mines in up to state 5 seas.

In the future, when the new AVENGER- and SANDOWN-Class ships enter the fleet, equipped with more modern underwater gear, it is expected that the mine search and destruction depth will increase to 200-300 m.

To increase their combat effectiveness, all MSHs are equipped with a combat information systems (CIC), optimized for mine countermeasure operations; [they are] structured and functional systems which have much in common. They include computers, which process information received from various ship subsystems and resources to illuminate the tactical (mine) situation for subsequent display on screens (CRTs) up to 500 mm in diameter. On the SANDOWN-Class, they intend to install distributed data processing. The information processing and display block is linked to an accurate navigation subsystem, which includes radar, gyrocompass, doppler log, marker and radio buoys, autopilot equipment with a sonar system, underwater equipment for surveillance and destruction of mines, and an anemometer. Information is displayed on the CRTs in alphanumeric form and in symbols. The system permits a constant display of the search area, illuminating the location of the ship, underwater mine contacts, destroyed mines and objects erroneously classified as mines, the ship's course and the boundaries of sweep legs, and, if necessary, the system permits the transfer of the images on the CRT to video tape with a subsequent redisplay at any time, and transmission of contact coordinates from the sonar screen to a repeater in the pilot house.

In addition, the system is used for automatic ship control (command inputs, error correction, computation of ship's location relative to marker buoys), and maintaining the ship on a predetermined course or at a specific point. In so doing, it takes into consideration the influence of the wind, current, sea state, as well as the statistical and dynamic characteristics of the ship and its power plant in determining the necessary time and delivery of repsective orders to the ship's command post. Using the power plant (main and slow speed) and the thrusters, they ensure the position of the ship in the coastal search area within 10 m. They are also capable of transmitting situational information to another ship or to a shore-based mine countermeasures command post.

The minehunting sonar serves as the basic search and mine classification system. Foreign specialists indicate that the sonar must be capable of the following: a high degree of credibility and success in classification and detection of underwater mine-like objects, and to do so at high speeds; as well as a probability of locating mines of various types; a clear display on the CRTs at the moment of contact; a low magnetic field, and be highly shockproof. The most commonly used systems in minecountermeasure ships are the French DUBM21A sonar, the British 193M and the U.S. AN/SQQ-14.

The first is installed on all TRIPARTITE program ships. It is a fixed system with a circular field of view, operating in a sector search mode (60 or 90^0), equipped with dual antennas (search and classification), with independent mechanisms for lowering and rotating. According to foreign press information, detection range of mine-like objects is 100-600 m. In the classification mode, a high illumination frequency provides necessary targeting accuracy. The sea bottom is illuminated under such a sharp angle, that clear reflection of objects is possible.

The sonar installation has two command posts. On the CRTs of the first, the entire search area is indicated and on the second, a blown up section, on which are shown comments concerning the object. The second indicator allows a much more detailed view of the object whose image can be fixed on the screen for 15 minutes. The sonar antennas are installed in a waterproof well, opened and closed remotely. A future modification of the sonar will be 21B (according to the foreign press, capable of detecting mines at ranges of 300-900 m, classifying them at 100-300 m and with a working depth of 80-100 m).

If necessary, in place of the contact sweep, they can use a towed side-looking sonar DUBM41B, with hydrophones (in special casings) moving at a constant distance above the bottom. In foreign specialists' judgment, this system has sufficiently good characteristics for searching for small submerged objects at ranges from 25-30 m.

The 193M sonar, with a variable depth antenna, and with digital signal processing, is installed in MSHs of the British BRECON-Class and the French LINDAU-Class. It has hydrophones, contained in dipping fiberglass bodies, stabilized in attitude and azimuth (the rotation angle in the horizontal plane is $+/-240^0$). Two operators (one for search, one for classification) control the system from one command post. Search is done in 16^0 sectors at ranges of 135, 270, 410 and 550 m. Contact information is input into memories, from which it can be retrieved for display on indicator screens (CRTs). The next step in British sonar development was design of the 2093 sonar with a towed antenna for the SANDOWN-Class MSH, which will work as well when hull mounted.

The AN/SQQ-30, designed for the first AVENGER-Class MSHs, is a modernized version of the very widespread past system the AN/SQQ-14. For the remaining AVENGER ships as well as for the CARDINAL-Class, U.S. and French firms are jointly designing the AN/SQQ-32, with a cylindrical and a linear antenna arrays and of variable depth respectively for search and classification.

Surveillance and destruction of detected mines is done with self-propelled remotely guided underwater equipment, the leading one of which today is the

French PAP 104. This equipment is propelled by two finned electric motors, operating on batteries (guaranteeing two 15 minute working cycles). The foreign press has indicated that the equipment can operate at distances of up to 500 m from the ship and at 100-m depth at 5 knots and searches for mines with a TV camera. The mine is destroyed by a 100-kg explosive charge placed next to it. The equipment locates the mine from information provided by the ship's sonar.

In the British SANDOWN-Class MSH it is intended to install a modernized PAP 104 (200 m working depth). They are planning to equip them with a high powered sonar, TV camera operating at low light levers, and a special rig for severing mine anchor cables.

In the first half of the 1980s, the Germans designed an underwater system PENGUIN B-3, equipping it with a sonar, TV camera and two searchlights - all with streamlined propellers as well as a vertical jet motor. The PENGUIN has a speed of about 6 knots, with a nickel-cadmium battery as a power source, giving it a 1-hour working period, considered sufficient to destroy two mines. As a variant, it is possible to use a silver-zinc battery with a 3-hour working cycle, however these have a shorter service life. Command signals for PENGUIN are transmitted digitally via a floating wire. For destruction of moored mines, instead of a bow charge, an explosive charge, capable of severing a mooring cable up to 26 mm diameter can be installed. The maximum working depth of a PENGUIN (the deepwater variant) is 300 m.

Future LERICI-Class MSHs may use Italian designed equipment instead of the PAP 104. They have installed a high resolution sonar, TV camera and two searchlights. The underwater equipment is equipped with hydraulic motors (a stern and two side) and has a low physical profile.

In 1984, the U.S. built the first underwater MNS system. U.S. specialists noted that among the existing systems in the West European navies there were serious shortcomings, such as: shallow working depth and short working cycles, lack of ability to detect buried mines, etc. Accordingly, the MNS has a depth of 200 m. It receives power and command signals from a 1,070-m long, negative buoyancy cable. By receiving power from the ship's power source, the MNS can operate up to 2.4 hours.

There are two stern-mounted propellers with one 11-kW hydraulic motor each and one vertically oriented screw in the central portion, as well as side thrusters. The MNS has a sonar, one explosive charge and equipment for severing mine cables, a hydroacoustic beacon for receiving signals into its guidance systems. The MNS can be lowered and raised in heavy sea states, due to a simple holding device, constructed on its upper section.

The above information from the foreign press about the active construction of mine countermeasure (minehunters) ships in the NATO navies is but another example of their intensive preparations for war at sea.

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SEVERAL FEATURES OF NAVAL NAVIGATION IN THE 1990s

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (signed to press 10 Oct 86) pp 56-58

[Article by Capt 2nd Rank V. Katenin; "Several Features of Naval Navigation in the 1990s"]

The militarist circles of the U.S. and other capitalist countries view naval forces as an important instrument to attain their long standing expansionist goals on the sea as well as on land in various regions of the world. Constantly increasing their fleets' strength, in addition to building new ships and designing more and more modern weapons systems, they are paying considerable attention to all means of assuring combat abilities, including navigation.

Foreign military specialists consider that, simultaneously with the evolution of views on the conduct of war at sea in the present era, the role and place of navigation in assuring combat ability of the Navy are essentially changing. The significance of navigation for the Navy has broadened from merely assuring safety of passage to assuring control of the modern battle. Thus, the dependence on navigation for conducting combat action grows along with expanding range and scale of application of navies in the course of executing combat missions. The role of navigation in providing sailing safety remains primary. However, under modern conditions, one of the main assignments of navigation systems has become the support of weapons employment. Navigational data for fire is used as the initial parameters for employing missiles or other weapons, for stabilization of launchers and various information inputs (radar, sonar, etc). As the range of ships' weapons increases, the dependence on the accuracy of navigational data for the conduct of an effective strike substantially increases.

Because of the complexity of the various types of weapons and the increase in large scale characteristics, which take up so much space on the ship, the installation on one carrier of a weapons suite and providing for the application of radio electronic equipment is a very difficult problem. For the future, it is proposed that some facilities (airborne and surface) will be primarily information sensors, others weapons platforms, and yet others systems for collection, processing information, and command and control.

However, such platforms, in foreign military specialists' opinion, have lesser capability in comparison with multi-purpose ships. In addition, the execution of complex and larger scale combat missions demands the use of operational groups or forces in which there would be a definite correlation of platforms of various types. The growing dependence between weapons carriers and platforms for technical systems has changed the problem for navigation from "where am I" to "where are we," and makes necessary the clear coordination between groups of forces in time and place, as well as a considerable exchange of information between them, which must come from all sources in real time and in sufficient detail to reflect the tactical situation in the combat action zone. This has substantively broadened the significance of modern navigation, going beyond the framework of action of a single ship. Navigation has become one of the key unifying factors in the operation of battle groups and fleets. Within the framework of such groups, each unit must know its own exact location relative to own forces, enemy forces, navigational hazards and the coastal features. The employment of resources for observation, identification, escort duties and joint combat action also depend on a knowledge of units and targets, both one's own and the enemy's.

Information about other groups and targets, received from a superior command in an absolute coordinate system, must be compared with data received through the battle groups own technical means of observation, which are in relative coordinates. In order to transform external information into a relative system of coordinates of the battle group and also to exchange information between forces in the group, who are executing the same battle problem and are widely disperses at great distances, a single universal coordinate system and geodesic reference point are necessary. Navigation has the very same inflexible demands.

Today, foreign military specialists note the tendency to differentiate requirements for absolute and relative accuracy of coordinates of platform location at various stages of combat mission execution. It is expected that in the 1990s, requirements for navigational accuracy in knowing the geographical coordinate location of surface ships will be 3-10 times higher than today, while at the same time they remain unchanged for naval aviation. On the other hand, demands for accuracy in a relative system of coordinates will increase for all platforms by 10-30 times. As they say overseas, this is dictated mainly by the ever-increasing significance of high accuracy coordination of action in time and place between various types of Naval forces.

Despite the fact that the basic navigational output data will become foremost, the following demands are being placed as well on prospective navigation resources: navigational information must be supplied in all systems of coordinates, necessary to platforms in order to carryout their missions; its development must be carried out constantly with a given accuracy in any tactical situation and in such a manner as to realize the capability, if necessary, to reproduce a platform's track (tactical maneuver) in the past, present and future; navigation means must have common, accurate time and course initiation accounting, as well as the capability to disseminate navigation information between subscribers on board a platform with simultaneous evaluation of its accuracy.

In order to satisfy these demands, foreign specialists consider it mandatory to develop radically new types of shipborne and shore technical navigational systems, designed on the basis of state-of-the-art technology, first in the area of electronic instrumentation, as well as in the area of digital computer technology and mathematical surety.

In contrast to civilian ships, which at the end of the 1990s, possibly will have automatic, crewless, programmable sailings, continuously updated during transit by high-accuracy global navigation systems, on combatants, automated command and control cannot fully be realized because only humans are capable of making correct decision in combat situations. Nevertheless a considerable part of the work of the ship's pilot will be done by qualitatively new integrated navigation systems.

The full process of automating command and control, weapons employment and the use of a platform's technical systems will probably be accomplished in a limited class of so-called crewless Navy systems designed to execute very narrow special missions, when the use of personnel is not possible as a consequence of great danger or physical limitations, naturally posed.

New generation integral navigation systems will possess much greater capabilities in comparison with existing forms. The most significant innovations are; the use of electronic charts, displayed on screens up to 2 m in diameter. Use of three dimensional displays (especially for submariens) permiting a view of the underwater situation at a glance, which is very important for avoidance of various hazards, including natural obstacles, sunken ships, etc. Three dimensional displays also can assure receipt of vitally important information for breaching minefields, minesweeping, ASW etc.

Integral navigation systems, as the foreign press notes, will have three operating modes: radar observation, development of electronic charts and collision warning. The system can operate in any combination of these modes.

In the first, the radar picture of the sailing area is displayed, oriented aither along a north-south axis or relative to the ship's course.

In the second mode, a simplified version of a selected navigational chart is given. A cassette with a magnetic tape program is input into the computer. A minimum amount of information, displayed on the electronic chart, includes: outline of the shore with construction (piers, moles, etc); ship's location, arrived at from data from various technical means; the characteristics of navigational equipment in the area; the outline of channels, fairwaters, demarcation zones for ships' movements; configuration of shallows relative to the ship; comments on depth and bottom contour; navigational hazards; characteristic details of radar or visual display of the shore, oriented and convenient for designating locations; dangerous bearings, planned transit route with advisory remarks. In addition, one can also display lighted and flaring beacons and lights with characteristics (period and color) corresponding to the real thing.

The electronic chart is automatically corrected by means of data input on the changing navigation situation from the U.S. Defense department's automatic navigation information system, constantly input into the ships computer via satellite communications.

In the third operational mode, dangerous targets are displayed (up to 40 units) in the area of ship's operation and recommendations on collision avoidance are worked out.

The integral navigational system also performs other functions (navigational calculation, information documentation, etc), considerably lightening the duties of the helmsman on watch.

When approaching a port or a naval base, control of the ship passes to a shore service which automatically takes it at high speed through complex channels and fairwaters to its anchorage. This service will carry out the mooring or remooring of ships in the port area.

Providing high accuracy ship guidance depends, to a considerable degree, on modernizing existing means of course display. It is expected that success in this area of instrumentation (gyroscopes) will allow development of sensitive instruments of exceptionally high accuracy. In the period being discussed, cyrogenic gyroscopes will be widely distributed. In naval aviation, future developments will see radial laser gyroscopes, characterized by high dependability and relatively low production costs. Possibly, there will be other types of gyroscopes as well (nuclear, for example).

One of the basic means of determining locational coordinates in the 90s, according to foreign military specialists, will be the space station, carrying out surveillance, communications, navigation and identification of all moving objects on earth as well as complex systems of tactical information, providing navigation information to battle groups with a given accuracy in a relative (or absolute) system of coordinates. Considering the changes in the traditional role of navigation on the tactical side (constantly supporting weapons employment), Western specialists propose that space systems and systems of tactical information be the principal pillars of navigation systems for the period in question.

One of the trends of navigational system technical development along with creating modern computer technical means (especially microprocessors) is the mathematical support of their operations. This depends on the level of that development which was reached in theory many years ago, but practically became attainable only with the appearance of modern digital computer technology.

Toward the end of the current century one can anticipate the further introduction of new developments in non-linear mathematics, which will find very broad application in integrated navigational systems. Obviously, there will be other developments in the area of mathematics, which will permit an increase in the accuracy of navigational data.

On the whole, in the view of foreign specialists, realization in full of the technical means reviewed above is a new step in the development of navigation

for navies and, in a fundamental fashion, will change qualitatively the face of navigation into the next century.

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U.S. MARINE CORPS ENGINEER SUBUNITS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (signed to press 10 Oct 86) pp 58-61

[Article by Col (Res) Yu. Mezhuyev, Maj S. Mezhuyev; "U.S. Marine Corps Subunits"]

[Text] The U.S. Navy high command, maintaining its drive towards increasing the fleet's power, is devoting considerable attention to the development of its amphibious forces' seaborne contingent, to the modernization of the organizational structure and weapons of the Marines, whose units and detachments regularly participate in national military exercises and NATO exercises involving landings of assault forces in various regions. Much significance is given to engineer support of Marine combat activities.

U.S. Marine Corps engineer detachments are designated for providing the landing force effective engineer support in breaching enemy anti-amphibious defenses and in subsequent movement deep into the landing zone. According to the foreign press, basic attention must be paid to the following issues: engineering surveillance of anti-landing obstacles, construction of passageways, construction of field airstrips and landing zones, preparation and maintenance of supply and evacuation routes, arranging for construction of temporary buildings for command posts and rear area equipments, setting up mine fields and obstacles, conducting deception operations, supplying landing units and elements with resources from the engineer's weapons and with construction materials and water.

In accordance with the types of missions to be executed and the actual organizational structure, engineer support of amphibious operations is accomplished as follows: engineer battalion (organic engineer support for the Marine division); engineer support battalion (general engineer support for an amphibious force); engineer service squadron (engineer-airfield support for a Marine Air Wing).

Under combat conditions, when engineer units are not in a position to execute their most complex and heavy labor tasks independently, a navy construction battalion can be included with them, subordinated to the fleet commander and designated for quick and effective engineer support to the Marines, groups of ships and other types of fleet forces.

The engineer battalion (Fig. 1) on the Marine Division organization consists of six companies: staff and service, engineering support, and four engineer. The official complement is about 930 personnel.

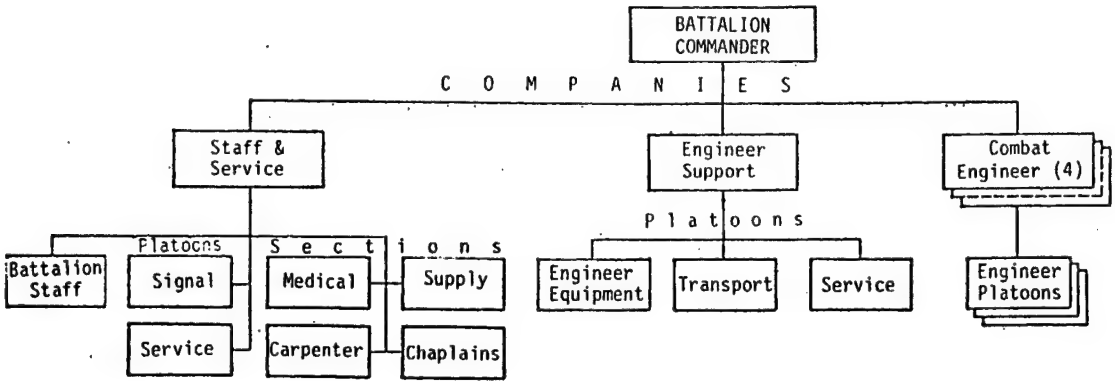

Figure 1. U.S. Marine Corps Division
Combat Engineer Battalion Organization

The staff service company (180 personnel) does all the command, control and communications and organizes rear area support for the battalion units. It includes: a battalion staff, supply and communications companies and also 4 sections - medical, carpenter, food service and chaplain.

Engineering support company is designated to reinforce personnel and engineering technology to battalion units during the conduct of combat tasks. In addition, it furnishes water and electricity to elements of the Marine division, supplies them with refrigerated systems, performs technical service and repair of engineering gear, and implements the deployment of shower and sanitation facilities and disinfection systems. The company numbers about 270 men. It has three platoons: engineering machinery, transport and service.

The main task of the engineer company is to provide engineer support to combat actions of the three Marine regiments, and artillery regiment, other elements and detachments of the division. The company, including the three engineer platoons) contains about 120 personnel.

Basic combat engineer capabilities of the engineer company can be seen in the following indicators: engineering reconnaissance in one hour of ten passages 8-meters wide, in enemy anti-amphibious obstacles to the shore; construction in 30-40 minutes of 15-20 paths through minefields with the aid of the M58 extendible explosive device; and emplacement of anti-tank minefields stretching for 300 running m in 7-8 hours.

In addition, the engineer company is capable of the following: equip a landing zone for helicopters, furnishing technical aid to elements and units of the

division in erecting field defense structures, and acting as a mobile defensive squad.

The engineering support battalion (Fig. 2) on the staff of the rear service group, is designated for performance of general engineering support to a marine expeditionary force. It numbers 8 companies: staff service, supply, two bulk fuel supply, three engineering and a bridge company. The batallion personnel number about 1660 people.

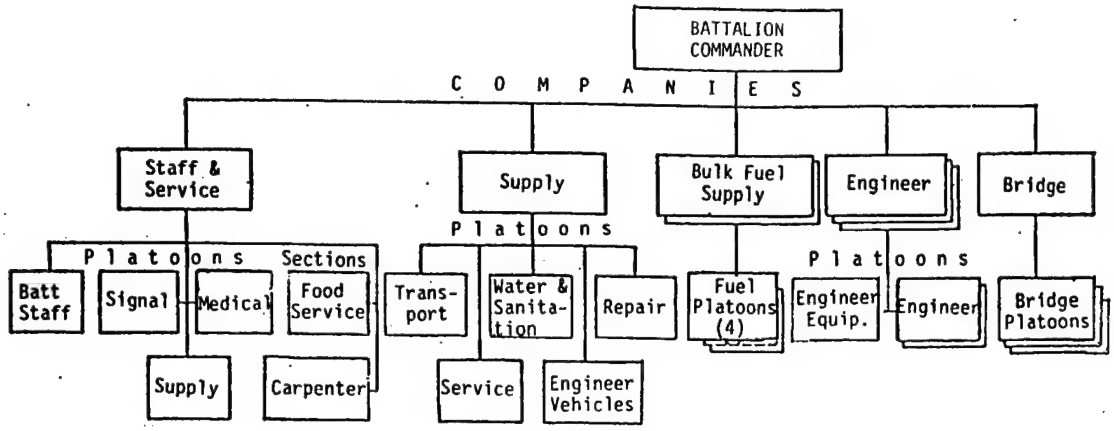

Figure 2. Organization of an Engineer Support Battalion

The staff service company of 170 people, provides command and communications, medical support, and food service for the battalion. It includes: the batallion staff, three communications platoons, a supply and medical platoon and two sections - food service and chaplain.

The 350-person supply company is assigned the tasks of furnishing batallion detachments with transport, spare parts for repair of engineering and transport vehicles, water and electricity, as well as to reinforce the battalion engineer company with heavy engineering machinery. It includes five platoons: transport, water supply and sanitation services, repair, service and engineer equipment.

Provision of fuel to elements of the Marine expeditionary force is made by bulk fuel supply companies (2), each of which (300 personnel) consists of 4 platoons. The company can deploy and operate eight fuel supply points and deliver it over distances of up to 6 km in soft, flexible hoses and, using automatic supply tanks - up to 30-40 km.

Three engineer companies are designated to execute actions in engineer support of the combat activities of the expeditionery division. If necessary, they can be reinforced by engineering equipment resources and personnel assigned to the staff service or supply companies. Each company (130 personnel) includes an engineering equipment platoon and two engineering platoons.

The bridge company is tasked with construction, technical servicing and direction of collapsible bridging and pontoons. It has three bridging platoons, generally with 140 personnel in each. The following displays the basic capabilities of the companies: setting up of two floating bridges of 60 ton capacity across a 73 m-wide water obstacle in 5 hours; and emplacement of a pedestrian floating bridge across 110 m in 20 minutes. To deliver the bridging equipment to its emplacement points, the company has allocated vehicles from the battalion supply company of the Marine Expeditionary Division rear service group.

The engineer service squadron, organizationally coming under the aviation service group of the Marine Air wing (MAW), is designed for engineering airfield support for basing aircraft and helicopters, as well as for fuel supply. It is capable of the following: carrying out engineering surveillance in support of the wing's aviation groups; repair and support of the road network in the area of airfield employment; construction and maintenance of landing zones for helicopters and light reconnaissance aircraft, erection of temporary camps, control over observance of deception demands; and deployment of mobile means of electrical power supply and of water. Th squadron has the following sections: oeprations, engineer, service, fuel supply, administrative, repair and heavy equipment, and is staffed with 798 personnel.

As reported in the foreign press, the engineering sections of the squadron can equip a field airstrip for take off and landing of vertical or short take off aircraft in 3-4 days.

The general amount of engineering equipment and resources of an engineer and engineer support battalion as well as an engineering service squadron are displayed in the table.

For a successful amphibious assault, according the U.S. military experts, it is mandatory that the organization and capabilities of the engineer detachments which are incorproated into the landing force groups, match the type and character of the combat problems to be solved by the landing forces.

In connection with this, the U.S. Marine command has strongly supported the following principles of combat utilization of engineer detachments in amphibious operations:

--apply them mainly to execute the first and immediate operational missions which demand special preparation of personnel and utilizaiton of enginner resources;

--concentrate the strength of engineer detachments on the primary thrust axes according to the operational plan and the priority of the combat objectives;

--include the break up of engineer detachments into working commands, if their organizational integrity is destroyed.

TOTAL QUANTITY OF ENGINEER ARMAMENT
AND EQUIPMENT RESOURCES

ENGINEER ARMAMENT AND EQUIPMENT RESOURCES	Combat Engineer Battalion	Engineer Support Battalion	Air Wing Engineer Support
Equipment for setting up obstacles and for obstacle clearing	129	72	9
Assault-crossing and bridge building equip.	9	70	21
Field water supply equipment	19	69	74
Electrical equipment	161	226	147
Earth-moving and road equipment	58	91	30
Hoisting equipment	18	18	42
Motor vehicles and trailers	81	171	72

In connection with the above listed principles, the engineer battalion bears the responsibility for complex engineering service to components and detachments of the Marine division and implementation of engineering functions to assure its rear service component's actions. Ordinarily for engineer support of combat activity, each marine regiment is assigned an engineer company and a battalion - a reinforced engineer platoon.

The engineer support battalion, which serves a Marine expeditionary division, concentrates the basic energies of its detachments on support of amphibious assaults and the forcing of water obstacles. If necessary, the battalion can detach or assign reinforced companies for continous support of the division or a Marine air wing.

The engineering service squadron is called upon to provide engineer-airfield support for the MAW. Its complement and equipment make it capable of supporting the gasing of each tactical aviation group as well as to supply engineer forces and equipments to supplement the air wing staff.

The naval construction battalion, assigned to the staff of the engineer detachments to furnish support to the operational amphibious units or landing forces, is capable of the following: to construct field airstrips and roads, to participate in equipping forward bases for battle forces of ships; to conduct engineer/construction work to support rear activities of the landing units and to accomplish engineer equipping of amphibious landing bases.

The information, found in the foreign press, demonstrates that engineer detachments of the Marine Corps - the strike elements of U.S. imperialism - play a substantive role in support of combat activities of the Marines and enable them to execute combat missions assigned to them in a qualitative manner.

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AMERICAN SHIPBOARD COMMUNICATIONS SYSTEMS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (Signed to press 7 Aug 86) p 62

[Article by Captain 1st Rank N. Starov: "American Shipboard Communications Systems"]

AMERICAN SHIPBOARD COMMUNICATIONS SYSTEMS

NOMENCLATURE	FREQ RANGE (MHz) / BAND SPACING (Hz, KHz)	TRANSMISSION TYPE / MODULATION TYPE	OUTPUT POWER (W) / SENSITIVITY (microvolts)	DIMENSIONS (cm) / HGT/WIDTH/DEPTH	WEIGHT (kg)	INSTALLATION LOCATION
R A D I O S E T S						
AN/URC-77	1.6 - 30 / --	Phone / AM monopulse	125 / 0.5	18/41/43	22	Surface ships of various classes
7600	2 - 30 / 100	Phone, TTY, Digital / AM monpulse	1,000 / 0.4	182/61/76	454	Surface ships of of basic classes
AN/URC-88	2 - 30 / 100	Morse, Phone, TTY, ----- Digital / AM ----- AM monopause	1,000 / 1	do	---	Surface ships of basic classes, submarines, mobile shore sites and comms networks
AN/URC-97	2 - 30 / 100	Phone, Digital / AM monopulse	1,000 / 1.2	do	---	Various classes of surface ships mobile shore sites and comms networks

AMERICAN SHIPBOARD COMMUNICATIONS SYSTEMS (Continued)

NOMENCLATURE	FREQ RANGE (MHz) / BAND SPACING (Hz, KHz)	TRANSMISSION TYPE / MODULATION TYPE	OUTPUT POWER (W) / SENSITIVITY (microvolts)	DIMENSIONS (cm) / HGT/WIDTH/DEPTH	WEIGHT (Kg)	INSTALLATION LOCATION
AN/SRC-20A	225 - 400 / (50)	Morse, Phone / AM	100 / 6	140/56/69	240	Various classes of surface ships, shore comms nets
AN/URC-93(V)	225 - 400 / (50)	Phone Digital / AM, FM FM	100 / 6	31/48/57	59	Various classes of surface ships
AN/WSC-3	225 - 400 / (25)	Phone TTY, Digital / AM, FM FM, Phase mod	30 (AM) / 3.5 100 (FM) / 3	31/48/58	67	Basic classes of surface ships, submarines
AN/WSC-6	7,900 - 8,400 / ---	Morse, TTY, Digital / AM, FM	8,000 / -	---	---	Flagships

T R A N S M I T E R S

RF1130	1.5 - 30 / 100	Morse, Phone, Digital / AM AM monopulse	1,000 / --	72/48/44	122	Various classes of surface ships, mobile shore sites, comm nets
AN/URT-23(V)	2 - 30 / 100	Morse, Phone, TTY / AM AM monopulse	1,000 / --	90/50/51	160	Basic classes of surface ships, submarines, shore comms networks
AN/URT-24B	2 - 30 / 100	Morse, Phone, TTY / AM AM monopulse	100 / --	45/50/48	102	Same as AN/URT-23(V)

AMERICAN SHIPBOARD COMMUNICATIONS SYSTEMS (Continued)

NOMENCLATURE	FREQ RANGE (MHz) BAND SPACING (Hz, KHz)	TRANSMISSION TYPE MODULATION TYPE	OUTPUT POWER (W) SENSITIVITY (microvolts)	DIMENSIONS (cm) HGT/WIDTH/DEPTH	WEIGHT (kg)	INSTALLATION LOCATION
		R E C E I V E R S				
MSR 5050	.01 - 30 10	Morse, Morse, Phone, AM AM monopulse Digital, Teletype AM monopulse FM	------ (AM monopulse) 3(AM), 0.5	13/48/44	do	Various classes of surface ships
MR 3040A	.015 - 30 10	Morse, Phone, TTY AM AM monopulse Facsimile AM monopulse	-- AM 3, 0.5 (AM monopulse)	13/48/43	8.6	Same as MSR 5050
67011SB	2 - 30 100	Morse, Phone, Digital AM AM monopulse TTY FM	-- 0.25	17/48/61	33	Various classes of surface ships, mobile shore sites and comms nets
AN/SRR-1	240 - 320 --	Digital FM, Phase modulation	--	do	do	Same as 67011SB

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AUSTRALIA

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (Signed to press 7 Aug 86) pp 63-71

[Article by Col V. Mitrich; "Australia (Physical-geographic conditions, governmental structure, economy, infrastructure elements and armed forces)"]

[Text] Australia is a developed industrial-agrarian country, situated on the Australian continent, the Tasmanian islands and other small island groups (Fig. 1). It plays an active role in the political life of the Asian-Pacific region and, in economic power, occupies second place among the capitalist governments after Japan. Its natural resources and broad capacity for development of its industry and agriculture, in Western economists' estimate, create beneficial conditions for increasing the role of Australia in the world. But along with that, Australia itself has become an object of rivalry of American, Japanese and British monopolies, in which in recent years Japanese capital is beginning to play a greater and greater role.

In the conduct of its domestic and foreign policy, Australia maintains a pro-American course, cooperating very closely with the U.S. on a bilaterial basis (Canberra is tied to Washington by a string of special military pacts) and in the framework of the aggressive ANZUS (Australia, New Zealand, U.S.) pact. For many years, Australia has regularly participated in multilateral exercises with the U.S., including KANGAROO and RIMPAC, in which, as a rule, aggressive strike operations are practiced.

In the aggravated situation of the international situation, brought about by the activities of the American administration, the Asian-Pacific region, from the point of view of Pentagon strategists, has become "a forward front line," and in this the signifiance of the Australian continent with the U.S. military bases, located on it, has grown in the global military-political strategy of Washington.

The development of Australian territory at first grew slowly. But since they were opened in the beginning of the 19th century, gold deposits drew settlers there. In the 1870s, six independent colonies existed on the continent, joining together in 1900 into a federation, known as the Australian Union. In 1901, the Union received the status of a dominion and, then, pursuant to the Westminster Statute of 1931, the right of full independence in internal and

external affairs. However, up until the Second World War, London maintained actual control here.

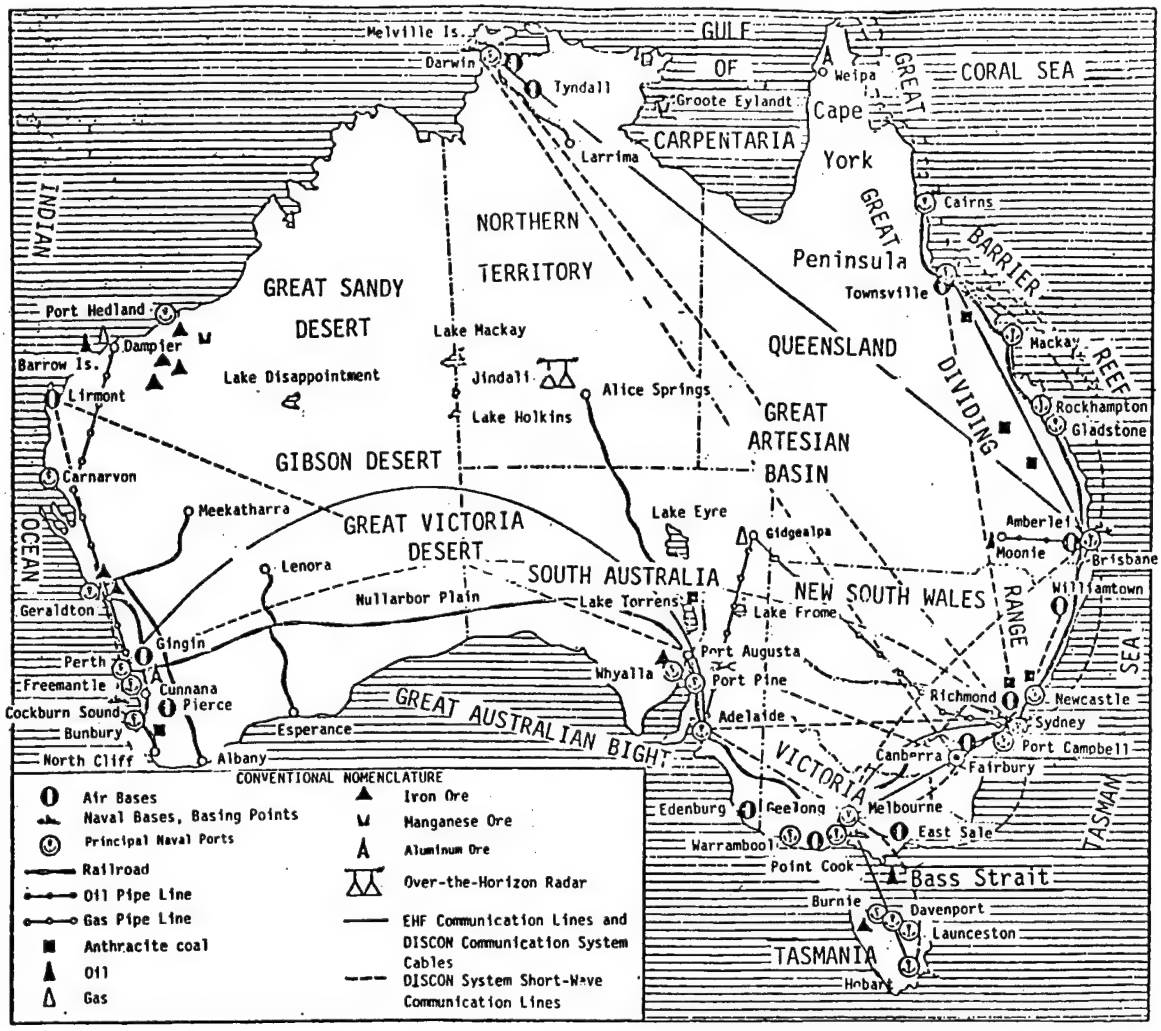

Figure 1. Primary Elements of Australian Infrastructure

The defeat of British troops (which included Australians) in 1941-42, in Southeast Asia, was the major factor driving a reorientation of Australian ruling circles toward the U.S. Canberra followed Washington's lead in both domestic and foreign policy, and the country began to play a role as an important American staging area in the Pacific region. The fact that Australian forces took part in the aggression against Vietnam is illustrative of the politico-military direction of the Australian government in the 1960s.

In recent years, the politico-military leadership has continued to follow a policy based on the concept that the security of Australia is not dependent on the U.S. and an American presence in the Asian Pacific region.

PHYSICAL-GEOGRAPHIC CONDITIONS. A large part of the territory of the Australian continent lies below the tropic of capricorn. The expanse of the continent in latitude is about 4,100 km and in longitude about 3,200. Its area is about 7.7 million km^2, which is almost equal to the area of the U.S. (excluding Alaska) and 30 times larger than the area of Great Britain. The west coast of Australia is washed by the Indian Ocean and the east coast by the Tasman and Coral Seas.

Australia is the lowest and flatest of the continents. Its average height above sea level is less than 300 m, while for the earth overall this dimension is almost 700 m. The mountains of the Great Dividing Range stretch along its entire east coast. In the central part, the average altitude is 900 m and in the south, mountains reach 2,000 m. Railroads and main highway routes cut through the range.

The central part of the continent is a hot, waterless and desert zone. The western plateau is bounded on the south by the Nullarbor Plain, which is nearly devoid of vegetation, on the southwest by the Darling range (200-300 m) and, only on the eastern boundary of the plateau do mountains rise 1,200-1,400 m high.

The continent's coastline is weakly defined, except for the coast of the Arnhem Land Peninsula and the region to the West. In the north and in part of the Northwest of Australia, the shoreline is steep and its low-lying sections are marshy. The bays are shallow, the bottom muddy. Channel dredging work was necessary to develop useful approaches to the ports. In the Coral Sea, the Great Barrier Reef, which is broken up into natural simuous channels and passages, stretches out to 50-100 km from the shore. The Western and Southwestern beaches are principally low-lying. The Southern coast has virtually no usable harbors.

The country lies in four basic climatic belts - subequatorial, tropical, subtropical and moderate. However, at the junctions of one belt, climatic conditions can very greatly. The most precipitation falls in the North: 100-1,500 mm and in several places exceeds 2,000 mm a year.

The stopping of the moist ocean winds by the Great Dividing Range and the elevated regions of the Western highlands results in aridity of the internal regions of Australia. The internal water network is poorly developed.

The rivers on the eastern slopes of the great Dividing range are not long, and, in the coastal valley, many of them at the mouth can be navigated by large oceangoing vessels. In the north and west coastal areas the rivers are shallow. In dry periods of the year they get very shallow, almost dry. Only the Murray River maintains constant flow as the largest Australia river and its principal tributary, the Murrumbidgee.

At the same time, a distinguishing feature of Australia--the rather large supplies of underground water, which are concentrated in artesian wells (occupying almost a third of the continent) including the Great Artesian basin--is the largest in the world. These waters play an important role in satisfying agricultural needs in arid and semi-arid regions.

POPULATION AND NATIONAL STRUCTURE. Australia's population is 15.7 million (per data at the beginning of 1985); of which there are 1.74 million men between the ages of 18 and 30 and 1.67 million men between 31 and 45 years old. The rate of population growth following World War II was the highest among developed capitalist countries. Immigration played a significant role in this.

Average density on the continent is 2 persons per km^2, which compares to Asia ($76/km^2$) and Europe ($94/km^2$). However, it is spread unevenly. Almost two-thirds of the entire population live in the southeast and east regions (13 per cent of the territory). Australia is the most sparsely populated country but, at the same time highly urbanized. More than 85% of Australians are city dwellers and almost half of these live in just two cities: Sidney (3 million) and Melbourne (almost 3 million). Other large cities are Brisbane (more than one million) and Adelaide (almost 1 million).

The Anglo-Australians (descendants of emigrants from England and Ireland) comprise 80 per cent of the population. In addition to these, 9 per cent come from immigrants from the British Isles, and 2 per cent from Italy. The number of other national groups is not very great - the most significant of these are the Chinese and Indians. Over the course of decades, the indigenous natives were annihilated or driven into reservations. Only in 1967, under pressure of wide sections of the society, were discriminatory articles of the constitution changed. By the beginning of the 1980s, the aborigines numbered fewer than 50,000.

The national language of Australia is English. The predominant religion is Christianity, wherein there are more Protestants than Catholics. The capital is Canberra (more than 250,000 population).

Australia is a federal state. It is made up of 6 states and two territories (including the capital), as well as a string of islands, part of which do not have a permanent population. In form, the country's ruling system is a constitutional monarchy. The Queen of England is considered the head of state. She is represented by a Governor-general, appointed by the Queen at the recommendation of the Australian government. The highest lawmaking body is the Parliament, consisting of a Senate (76 Senators, elected for 6 years) and a House of Representatives (148 members, elected to a 3-year term). Formally, the highest executive authority resides in an Executive Council, headed by the Governer-general. In practice executive authority is wielded by the government headed by the Prime Minister who is the leader of the party victorious in federal elections. The states enjoy considerable autonomy.

MAIN POLITICAL PARTIES AND TRADE UNIONS. The Australian Labor Party, the ruling and most numberous party, was founded at the end of the 19th Century. It incorporates small- and middle-scale entrepreneurs, farmers, laborers, and on the right of the collective organs, many trade unions and other social organizations. Australia's Liberal Party has been in existence since 1944, and it reflects the interest of the large bourgeoisie. The National Party of Australia was formed in 1916, as the party of large land holders, cattle breeders and the financial activities connected with them. The Liberal Party finds support in the majority of issues. The party of nuclear disarmament was organized in 1984, and has joined the active participants in the movement of

supporters of peace. In 1920, the Communist Party was founded in Australi and in 1972, the Socialist Party. In addition there is the Party of Australian Democrats (1977).

There are almost 320 trade unions in the country, organizing about 3 million men. The largest percent is the Australian Trade Union Council, with about 2.7 million. As a result of rather complicated traditions and responsibilities for the development of Australian capitalism, the trade union movement plays a noticeable role in the politco-social life while, at the same time, it is characterized by a great divisiveness.

The press, radio, television, films, and other media are employed for ideological effect on the population. In the country, over 500 nationwide, city and provincial newspapers are printed. The most-widely distributed daily national newspapers are THE AUSTRALIAN, SYDNEY MORNING HERALD, AGE and HERALD. All of the largest papers, who's political inclination is determined by monopolies, belong to four concerns--the highest level of press monopoly.

THE ECONOMY. Australia possesses great economic potential, although, in the world capitalist economy, it basically serves as a supplier of raw minerals and aricultural products. The country's share of collective industrial production within the developed capitalist world in 1981-85 was 2.1 per cent, and the total gross national product, 2.2 per cent. The average annual GNP for those years was 175 billion American dollars.

One must note the significant position in the economy of foreign capital as an important special feature of Australian economy. It controls the output of almost one-third of the process production and two-thirds of the steel production industry, and in several key offshoots this share reaches 80-100 per cent. Another noticeable feature is the high level of concentration of production, especially in processing, oil refinery and steel production industries and in ferrous metallurgy.

RAW MATERIALS AND ENERGY RESOURCES. Australia occupies the leading place with respect to reserves of mineral raw materials and energy resources in the capitalist world. Among these natural riches are iron, manganese, copper, lead, zinc, tungsten, as well as bauxite ore. Of the nonmetallic minerals to be found the most important ones are diamonds, phosphate ore, gypsum, blue asbestos and mica.

In the 1983/84 fiscal year (starts on 1 July), ore extraction consisted of (in millions of tons): bauxite, 23.6 (first place among capitalist nations); iron ore, 79.7; zinc, 0.7 and lead, 0.5 (2nd place in the world).

Large reserves of coal are found on the 5th continent, which, according to Australian economists, are sufficient for satisfaction of domestic requirements and for export. The country has moved into the ranks of the leading exporters of uranium, reserves of which are the most in the capitalist world. Extraction of natural gas is growing rapidly. Prospective reserves of this commodity have been discovered on the northwest coastal shelf, whence there is a 1,600-km pipeline to Perth for export, primarily to Japan.

Australia is about 75-80 per cent self-sufficient in oil. Hydroelectric energy sources are insignificant.

Among the offshoots of the processing industry, one of the first places is held by metallurgy particularly by virtue of the rapid pace with which aluminum smelting is growing. By 1985, production capacity was approximately 800,000 tons a year (in 1979 it was 300,000). In Gladstone, there is the largest aluminum-producing factory in the capitalist world. Other branches of ferrous and non-ferrous metallurgy are developed, important centers of which are located in Port Campbell (where up to 60 per cent of steel production capacity in the country is concentrated at one factory), Newcastle, Whyalla, and Kwinana. Metal production in 1983/4 was as follows (in thousands of tons): steel, 6,161; refined zinc, 300; lead, 193; copper, 167; and silver and gold, 343 and 28.5 tons respectively. Machine manufacture also occupies a leading position (most highly developed in the southeast and south of the country), as well as processing of agricultural products. Machine construction plants produce automobiles (almost 370,000 per year, including 340,000 compacts), and electrotechnical and electronic equipment. Transport machine construction has been developed in Perth, with large ship construction plants located in Melbourne, Sidney and Newcastle.

Agriculture is highly marketable and mechanized, fully satisfying the meeds of the country in farm products and grain. In the beginning of the 1980s, it contributed about 6.5 per cent of the GNP, and it constituted a real share of the export business, basically because of the call for wheat (in 1984, its harvest reached 22 million tons). They also grow barley, oats, rice, and corn. Sheep raising plays a considerable role in the economy; and meat and dairy cattle growing is well developed.

Foreign trade is very important for the Australian economy. In FY 1983-84, the portion of agricultural production exported consisted of 34 per cent (in recent years this indicator has shown a tendency to decline); raw materials and oil, 29 per cent and manufactured goods, 12 per cent. The share of the latter two categories of goods is growing. About 40 per cent of imports are attributed to machines and equipment. Their primary trading partners are Japan, America, Great Britain and New Zealand.

The role of TRANSPORTATION in a country with such vast spaces and so remote from other countries is especially large. In all, in Australian economists' estimate, the resources at hand do not fully satisfy the requirements.

Up to 75 per cent of the cargo/passenger conveyances serve as automobile transportation. There are about 8 million cars, including about 6 million compacts. Highways are the main transportation medium. Overall length is almost 815,000 km, of which almost 480,000 are hard surfaced. A large portion of all highways is situated in the eastern part of the country.

Rail transportation is assigned a key role. Its role in freight transport has substantively increased. For the last 20 years the quantity of freight carried on the railroads has increased more than 2.2 times. At the same time the number of transported passengers has somewhat decreased. The general expanse of rail lines comprises almost 41,000 km, of which almost 39,000 km are

government-owned. Even now in Australia there are rails with varying wheel gauges: wide, 1,600 mm; standard, 1,435 mm and narrow, 1,067 mm.

There are almost 1,700 diesel-electric locomotives in Australia. The majority of the rail lines are not electrified. The railroad network is most developed in the coastal, industrial areas of the southeast and south, while in the interior regions there are hardly any railroads. east and west are connected by the Sidney-Perth line. The route from Darwin to Larrima stretches in a north-south direction and from Alice Springs to Port Augusta. In 1983, the government approved a project to construct by 1988-89 a 1,420 km, standard gauge railroad from Darwin to Alice Springs. However, as reported in Western press, the project is threatened with termination due to financial difficulties.

Maritime transport has received special development, although the actual commercial fleet of Australia is not large (34th in the world). In 1984, it consisted of about 600 ships of a general gross displacement of 2,173 thousand gross registered tons. There are many small ships in this number; about 75 per cent of the general number have a cargo capacity under 500 tons. As a rule, Australian ships carry out cargo shipments between the country's ports, Australia and the Oceania Islands and several other countries of Southeast Asia. The extensive maritime routes are served by the commercial companies of the U.S., Great Britain and Japan.

To ensure delivery of cargo by sea along the coast of the continent and Tasmania, there are more than 60 ports, several of which specialize in processing ore, coal and wheat. The most convenient and well disposed harbors and bays, and the respective ports are located in the east and southeast regions. The largest of these are Port Hedland, Sidney, Freemantle (the most accomodating port in the west part of Australia), Melbourne, and Newcastle. Cargo turnaround in these ports is more than 10 million tons a year.

The extensive capacity of Australian ports, to service and repair oceangoing ships, creates good conditions for their use in serving the needs of the naval forces of the countryand its allies.

Air transportation is well developed on the fifth continent. An extensive airfield network has been developed everywhere, comprising some 450 airfields (according to 1983 data), of which almost 85 per cent belong to private firms. 174 airfields are equipped to handle night flights. Within the network, there are 26 air traffic control centers. The largest air company is the state owned QUANTAS, which does the majority of air transportation within the country and all external flights.

Good climatic conditions and considerable distances between populated centers has served to underlie the development of pipeline transport of products. Basically, pipelines are used for transfer of water (sometimes over hundreds of km) as well as gas and oil. In many cases the pipeline is laid directly on the ground.

The DEFENSE INDUSTRY of Australia, as the foreign press reports, has, to date, developed to such an extent as to allow the production of many types of

weapons and combat technology for the Army, Air Force and Navy. Both governmental and private corporations produce military hardware.

According to information in the Australian press, the country imports the most modern airborne missiles, naval and other technology, and in so doing, spends, on the average, for equipment from overseas, about 70 per cent of the resources allocated for acquisition of all types of armaments. With respect to lesser complex weapon systems, demands for them are satisfied by internal production. For the armed forces, more than 10 research and development centers, institutes and laboratories (including some civilian labs) carry out design for new weapons.

Of three large aircraft missile companies, the largest is the state-owned "Government Aircraft Factories," whose facilities are located in Fisherman's Bend and Avalon (Victoria Province). The private firms, "Commonwealth Aircraft" and "Hawker-deHaviland," each have several factories in various regions. As an offshoot of this business, they produce Australian-designed transport aircraft, such as the NOMAD and the ASW plane ICARUS, a guided drone JINDIVIK as well as several components for aircraft (including the F-18) and helicopters of overseas design, with which the Australian armed forces are equipped, and for export. Productive capacity is fully utilized.

Government naval piers are Garden Island and in Williamtown. At these piers, and at others of private companies, they construct patrol craft and they can perform repair of combatant ships of basic classes.

Production of artillery and rifle armament is the responsibility of state factories in Bendigo, Maribernong and Lithgow, and ammunition in the factories of Saint Maris (artillery and mortar, bombs, missile warheads of various designation) and in Footscray (cartridges for rifles and explosives). Explosive devices are manufactured at state factories in Albion, Maluala and Maribernong (the same place where rocket motors are assembled).

The ARMED FORCES OF AUSTRALIA consist of regular ground forces (Army), the Air Force and the Navy. According to figures in the foreign press, personnel in the regular armed forces number 70,700 men (ground forces - 32,000; Air Force - 22,000; and Navy - more than 16,000), and in the reserves there are 31,500 (29,000, about 1,300 and more than 1,200 respectively). In addition, about 24,000 civil servants are employed by the Armed Forces. Even in Western defense specialists' opinion, this significantly exceeds national requirements.

Orientation toward the U.S. in the conduct of defense policy demands a continual increase in defense expenditures. At the end of the 1970s, the government announced its annual growth at 7 per cent, but, in fact, this growth process proceeded at an even greater tempo. Only for the last two years has the annual defense budget grown by 10 per cent and in the FY 1985-86 consisted of 6.53 billion Australian dollars. Its share of the overall country budget reached 9.5 per cent.

General management of the armed forces is the responsibility of the minister of defense. In the defense ministry (civilian head) under his chairmanship

there is a defense council, whose membership included the permanent deputy minister of defense, the country's armed forces commander, the heads of the military services, and the assistant to the minister of defense for defense industrial affairs. This council performs the functions of a consultative body on issues of armed forces structure. A military committee prepares and submits recommendations to the minister of defense on general problems of defense policy, its foreign policy, economic and financial aspects as well as of coordination of civilian agency activities. Its chairman is the permanent deputy minister of defense, and members are the highest military leaders, the chief of the chancellery of the prime minister is the cabinet, responsible members of the ministry of foreign affairs, and the treasury. Representatives of other ministries are included when necessary.

Operational direction of the armed forces is executed by the armed forces staff, which constantly develops plans for employment of the forces, their operational and mobilization deployment, basing systems, organization of combat training/exercises and rear security. The staffs of the three armed forces are subordinated to this staff, the chiefs of which staffs are also in command. Operation, rear and training commands are subordinate to the army staff; the operational and rear, to the air force; and fleet command and rear area, to the navy staff.

Each type of force is designated to carry out combat actions independently, jointly with other services and to render support to the troops and forces of allied nations.

For the purpose of training command cadres, there was recently established in Canberra an Armed Forces Academy, where future officers of the army, air force and navy are trained. At the beginning of this year, the student population was more than 700. Officer cadres are trained and prepared as well in military and naval colleges, officer schools, air force academies, flight schools and other training establishments. In addition, some officers and generals undergo training in senior military colleges of other countries, mainly U.S. and Great Britain. Enlisted ranks are filled by recruiting volunteers.

With respect to military administration, the country is divided up into seven military districts (which roughly correspond to civilian states). The district staff is subordinated to the ground forces commander and is responsible for coordinating combat activity and rear security for units and detachments based there, as well as for solving issues of mobilized deployment of the army.

According to the foreign press, ground forces include an infantry division; one tank, two intelligence-sapper and four artillery regiments; five communications regiments an army aviation regiment and other elements and detachments. Most of their armament is of U.S., British or French manufacture. In all, the inventory includes more than 100 LEOPARD tanks, more than 250 artillery pieces, 20 RAPIER AAW systems, about 800 armored personnel carriers, 27 aircraft and 47 helicopters in army aviation and other weapons.

The Air Force, in addition to its mission of routine, inherent kinds of tasks, is assigned the air defense of Australia. As the foreign press reports, the Air Force consists of 18 squadrons, as follows: 2 fighter-bomber, 3 Air

Defense fighter; a reconnaissance; 2 landbased maritime patrol and others. They have more than 100 combat aircraft and over 260 aviation support aircraft and helicopters, including the F-111 tactical fighter, the MIRAGE-3 fighter-interceptor, P-3B and P-3C maritime patrol aircraft and the UH-1 B and H, AS-350B and the CH-47 helicopter. In upgrading their aviation inventory they have ordered from the U.S., 75 of the most modern American plane, the F-18 HORNET, a new order of BLACKHAWK helicopters (14 units) and other aviation technology. They are planning to convert four Boeing 707 transport aircraft into airborne tankers for in-flight refueling of tactical fighters.

In construction of military airfields (built with the aid of the U.S. and Great Britain), they were envisioned for use not only by Australian Air Force, but by aviation of other countries, primarily the U.S. Basic air groups of the Australian Air Force are based at fields (more than 2,500 m runways) of Amberley, Williamtown, Fairburn, East Sail, Edinburgh, Pierce and Darwin. In addition, the Australian Air Force utilizes airbases of Butterbort in Malaysia and the American base at Diego Garcia.

According to the foreign press reports, the Australian Navy (RAN) order of battle includes almost 50 ships and cutters (includign 3 destroyers, 10 frigates and 6 submarines), and more than 10 auxiliary support ships. Naval aviation includes the SEA KING and WESSEX ASW helicopters, the multipurpose IROQUOIS and BELL 208 [helicopters] and two HS-748 radioelectronic (EW) aircraft.

To increase the combat capabilities of the Navy, Australia is studying the question of ordering an additional six new subarines (German or Swedish), entry into the fleet of the first of these is planned for 1992; they are constructing, under U.S. license, two OLIVER H. PERRY-Class FFGs and two twin hulled minesweepers; and modern missile armament has been ordered.

Primary bases for the RAN are Sidney, Cockburn Sound, Melbourne and Jervis Bay; with staging areas at Brisbane, Darwin and Cairns. At the end of last year, the government decided to transfer the Naval Base from the aquatorium of Sidney Harbor to Jervis, located approximately 150 km east of Canberra. At first, all weapons and ammunitions stores will be transfered there (by 1992), then later, it will become an active submarine base, with piers and repair facilities for surface combatants. It is said that expenses for conversion of the base will be 1 billion Australian dollars. The reconstruction of the naval base at Sterling on Garden Island (in Western Australia) is planned for secure basing of new submarines.

Australia maintains tight military cooperation with the U.S. and other countries of NATO. It permits the U.S. use of its territory for defense purposes. Thus, the Pentagon has already created here more than 15 miltiary bases and activities. The U.S. uses the air base at Darwin for B-52 bombers. American warships are regularly found in the naval bases and ports of the country. Although many items are officially titled "U.S.-Australian", in fact, as reported in the Australian press, all are unilaterally used by the Americans behind the back of the Australians and without any notification of this fact.

One of the most important objects of the Americans is a center for receipt of information and transmission of commands via satellite at Pine Gap (a site with the least cloudiness in the world next to Alice Springs, occupying an area of about 26 km^2, where more than 200 American specialists work), a center for the reception and processing of information from satellites at Narrangar (situated in the state of South Australia, which, as noted in the American press, is a potentially important chain in the "Star Wars" program, and a U.S. Navy communications link in Exmouth (where about 370 U.S. servicement are assigned).

The constant attention which the U.S. has paid to the Indian Ocean region since the end of the 1970s, in terms of military-political interests and the conduct of its policies aimed at strengthening here its politico-military presence, have enhanced the role of Australia both as an ally with great military potential, but also as a partner who can place into orbit its military policy.

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B-1B BOMBERS AT DYESS AIR FORCE BASE

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (signed to press 10 Oct 86) p 75

[Article by Col V. Kondratev; "B-1b Bombers at Dyess Air Force Base"]

[Text] According to foreign press information, the first American aviation unit which will be supplied with the new supersonic B-1B bomber is the 96th Heavy Bomber Wing. It is scheduled to have one combat and one training squadron. The latter will be entrusted with the training of all personnel of all U.S. Air Force SAC units which will be equipped with the B-1B bomber. The wing is deployed at Dyess AFB (Texas). Work will be done for the stationing of the new aircraft, providing pilots, technical and field repairs along with its modernization. Specifically, 19 new buildings will be built and 46 buildings and structures will be rebuilt. The roads from the weapon depots to the aircraft hard stands will be reinforced because the transports for delivering missiles, aviation bombs and other ammunitions and supplies for the B-1B bomber is considerably heavier (the weight of several of them exceeds 30 tons), than similar deliveries of weapons supplied earlier to the B-52 bombers. The rating of the power supply (by the installation of additional electric substations) and the number of telephone communication channels are being doubled. Old depots for weapons, POL and other supply materials are being expanded and new ones are being built.

At the same time, new equipment is being installed at the base, including automated control and measuring systems and equipment for the testing and repair of onboard B-1B aircraft systems, and also state-of-the-art simulators (computer-based) for training flying and technical personnel. Here also they are developing laboratories for calibrating instruments and units of the onboard equipment and building hangers for servicing the B-1B aircraft, systems for checking, repair and storing engines and other items necessary for normal use of the new bombers.

To carry out the work mentioned above and a number of other items for the modernization of Dyess AFB, 100 million dollars have been allocated. Despite the fact that part of them are still not completed, the reequipping of the 96th Heavy Bomber Wing is proceeding at full speed. As the Western military press reports, by October 1986, the 337th Squadron of that Wing (15 B-1B) ought to become a part of the U.S. Air Force. By that time, there will be a

total of 21 B-1B based there, and by the end of the year, a total of 29. After that it is planned to equip SAC units, based at Ellsworth AFB (South Dakota), Grand Forks (North Dakota) and Mc Connel AFB (Kansas) with the B-1B bombers at which there will be stationed 35, 17 and 17 such aircraft respectively.

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BUILDING TRIDENT SSBNS IN GREAT BRITAIN

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (signed to press 10 Oct 86) p 75

[Article by Capt 2nd Rank S. Grechin; "Building the TRIDENT SSBN in Great Britain"]

[Text] In accordance with the plan to develop strategic nuclear forces, Great Britain's Ministry of Defense, at the end of April 1986, granted an order to Vikkers, at Barrow-in-Furness, for the construction of the nuclear missile submarine VANGUARD, the lead SSBN in the TRIDENT system.

The decision to remove the sea-based POLARIS system from the nuclear missile arsenal and replace it with the more modern TRIDENT system was taken in 1980. In 1982, the English Parliament approved a program to build a new generation of SSBNs, armed with the American TRIDENT-2 ballistic missile.

In accordance with that program, it is planned to build and transfer to the fleet by the middle of the 90s, four SSBN as replacements for the RESOLUTION-Class submarines currently in service. It is planned to mount 16 TRIDENT-2 missiles, with a range of up to 10,000 km, in each submarine (full-load displacement approximately 15,000 tons). A MIRV-Type warhead is being developed for these missiles by English specialists.

Construction of the SSBN VANGUARD is estimated at 1 billion, and the total expenditues for deploying the TRIDENT sea-based nuclear missile system comprise about 10 billion pounds sterling. It is expected that for the construction of the nuclear submarines up to 4,000 men will be employed at the shipyard directly and approximately another 5,000 are expected to be employed in other branches of industry.

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U.S. SIXTH LIGHT INFANTRY DIVISION

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (signed to press 10 Oct 86) p 76

[Article by LtCol I. Aleksandrov; "The U.S. SIXTH Light Infantry Division"]

[Text] According to information in the American press, an official announcement was made in the Pentagon concerning the beginning of the formation in Alaska of the 6th Light Infantry Division of regular forces. The American command rhetorically explained the division's deployment as necessary "for defense of the country from the threat from the north" and is carrying it out within the framework of the present ground force reorganization program, "Army-90." It is mentioned that the core of the 6th Light Infantry Division will be the 172nd detached brigade which, in connection with arrangements being planned, has alrady begun the transition to the new organized-regular structure.

It is emphasized in the foreign military press that it is planned to deploy the division staff and one brigade comprising two battalions to Fort Wainwright, and the second brigade (four battalions, one of them a parachute-airborne landing battalion) and several division element subunits to Fort Richardson. In case of a mobilized deployment, it is intended to bring the division up to strength with the 205th Independent Infantry National Guard Brigade being transferred from the central region of the U.S.

After the formation arrangements concerning the formation of the 6th Light Infantry Division are completed, it is intended to have in its armament, including the national guard brigade, light weight weapons and military equipment including 54 towed 105-mm howitzers, 106.7-mm mortars, 206 DRAKON and TOW anti-tank guided missile launchers, 522 M203 rocket anti-tank mortars, 18 VULCAN self-propelled air defense launchers, 90 STINGER air defense missile batteries (firing crews), 99 army aviation helicopters, 870 M966 1.25-ton high mobility vehicles and other armament.

American military specialists consider that the deployment of the division is planned to be completed by 1989. Its deployment in Alaska, in their opinion, will make it possible to have a highly mobile contingent of forces in that region, specially trained for carrying out missions under Arctic conditions.

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PROGRAM TO REARM JAPAN'S AIR FORCE WITH PATRIOT AIR DEFENSE MISSILES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (signed to press 10 Oct 86) p 77

[Article by LtCol V. Georgiyev; "The Program to Rearm Japan's Air Force with the PATRIOT Air Defense Missile"]

[Text] Simultaneously with building up strike aviation's combat power, Japan's armed forces command is paying a great deal of attention to increasing the effectiveness of the PVO system for protecting their administrative and political centers, important industrial targets and groups of forces from air strikes. With this in mind, since 1982, they have been equipping PVO fighter aviation with new F-15 EAGLE aircraft and a decision was made at the beginning of 1984, to introduce American PATRIOT air defense missile installations into the air force. The country's war department developed a program to rearm all six air force air defense divisions (1, 2, 3, 4, 5, and 6) with the new PATRIOT air defense installations.

In accordance with these plans, each division will comprise four batteries. Each battery will include one PATRIOT battery (five launchers). By the end of the program, it is intended that the air force will have 24 PATRIOT air defense batteries, in which there will be 120 launchers. Additionally, plans include the formation of two training air defense batteries (one air defense installation in each for a total of ten launchers).

Judging by foreign press information, it is intended that the PATRIOT air defense batteries will be produced in Japanese enterprises under American license and, for their deployment, the existing HAWK-J air defense positions will be used.

Appropriations for rearming the air defense installations should be released in FY 1985-1991. Thus, in FY 1985, the government approved expenditures in the amount of 32.6 billion yen for the purchase of two installations (ten launchers), intended for the two training batteries. Beginning with FY 1986, it is planned annually to ear mark the resources to purchase the four air defense batteries for one of the divisions being rearmed.

The PATRIOT air defense installations will enter service in 1988. It is expected the the first two batteries (training) will be formed in 1989, and

from 1990, the rearming of the air defense divisions will begin (one annually). It is planned to first rearm the 3rd Division (deployed in the Titose region on the Island of Hokkaido), after that, the 6th (Misawa), 1st (Iruma), 4th (Gifu), 2nd (Kasuga), and 5th (Naha on Okinawa)

In Japanese specialists' views, the replacement of the obsolete HAWK-J air defense installations with PATRIOTs will significantly strengthen the country's PVO system's capabilities to repel enemy air attacks.

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FOREIGN MILITARY CHRONICLE

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 86 (signed to press 10 Oct 86) pp 79-80

USA

Brigadier General G. Renner was appointed as commander of the 1st Mechanized Infantry Division in July 1986.

The first B-1B strategic bomber, equipped to carry air-launched cruise missiles on external pylons as well as in the bomb bay, has been transferred to the USAF Test Center (Edwards AFB, California). It has been assigned to fly missions in support of a complete flight test program for the B-1B/ALCM weapons system.

FY 87 appropriations of 1.14 billion dollars for a chemical weapon rearmament program are under scrutiny. Preparations are now being completed for large scale series production of 155-mm binary howitzer projectiles (begining in December 1987). The test range phase for the air-dropped BIG EYE chemical bomb has been completed. Deployment of these bombs will commence in September 1988.

Deployment of F-16 FIGHTING FALCON tactical fighters to elements of the U.S. Air Force in Japan is being accelerated. The first squadron of F-16As and Bs (27 aircraft) were deployed to the Japanese base of Misawa in June 1986, and plans dictate that the second squadron will be sent there by the end of 1987. As noted by the foreign press, however, this is a year ahead of schedule. Moreover, it will be equipped with a more modern variant of that aircraft, the F-16C and D (23 aircraft).

In May 1986, after 29 years in mothballs, the battle ship MISSOURI (BB-63) was put back in commission in the U.S. Navy. She has a full load displacement of 58,000 t, a length of 270.4 m, measures 33 m on the beam, draws 11.6 m, and has a cruising range of 15,000 nm at 17 kts. MISSOURI is armed with eight quadruple box launchers for TOMAHAWK cruise missiles, four quadruple launch canisters for HARPOON ASMs, three 406-mm triple gun turrets, six 127-mm dual gun mounts, and four 20-mm VULCAN/PHALANX Close-in Weapon Systems. It is envisioned that she will be able to accommodate three helicopters on an upper deck.

Fifty-three American ships have visited the Persian Gulf over the past 3 years. The permanent contingent of U.S. naval forces in the Gulf includes five ships, and another 13 in the Arabian Sea. The U.S. naval presence there, which is considered the cornerstone of their imperialist policy, has persisted for the past 37 years.

Allied Signal has developed a new nickel-based alloy to be used as a substitute for gold. It is designed to be used in electronic components which require exceptionally high reliability in long endurance applications. This alloy can be electroplated directly onto copper alloys without their previously having been coated with nickel. The annual demand for gold by the country's electronics industry now amounts to over 400 million dollars.

GREAT BRITAIN

The first of two BAe146 military transport aircraft, equipped to carry VIPs such as members of the Royal Family, government officials and foreign dignitaries, has entered service in the Royal Air Force.

Tests have been completed on the SEA EAGLE ASM. Eleven airborne launches were conducted at sea from various altitudes at both stationary and mobile targets. Dummy ships and boats of various displacements were used as mobile targets. The SEA EAGLE will be carried by BUCCANEER (air force) and SEA HARRIER (navy) aircraft.

The ASW carrier INVINCIBLE (R05) was sent in for modernization and overhaul in April 1986 (she enetered the fleet following construction in July 1980). It is anticipated that the work will take 27 months. Costs are estimated at 100 million pounds sterling.

The second ship of the third batch of BROADSWORD-Class guided-missile frigates, CUMBERLAND (F99), was launched in June 1986. A total of 14 frigates are planned to be built. Of these, seven are already in service with the Royal Navy, six are in various stages of construction and one is on order.

FRG

Messerschmitt-Boelkov-Blohm has developed a new explosive device, designated RAM, for rapid destruction of bridges and other large structures. It comprises a two-stage munition consisting of hollow and high explosive charges packaged in a special casing. In a synergistic process, the hollow charge explodes creating a hole in the structure that it hits (such as a bridge support) and the high explosive charge follows to deliver the final punch.

Deliveries of HARM anti-radar missiles purchased from the U.S. will begin in 1987. They are slated to be carried by TORNADO aircraft in elements of the FRG air force and naval aviation.

The PENGUIN-A1 remotely operated submersible vehicle is under going tests. It is desgined to search, detect and destroy bottom mines (including rocket propelled rising mines). It is 3.7 m long, 1 m in diameter, has a speed of 7

kts at 10 m depth and 3-5 kts at greater depths, and has an autonomous endurance of 8-10 hours.

FRANCE

Appointments for mid-1986:

- Corps General A. Liene to command the 1st Military District;
- Brigadier General A. Dupui de la Grande Rive to command the 5th Armored Division;
- Brigadier General G. Favreau to command the 6th Armored Calvary Division;
- Brigadier General G. Anglar to command the 8th Infantry Division;
- Brigadier General G. Ceau to command the 15th Infantry Division; and
- Brigadier General G. Ober de Perelong to command the 27th Alpine Infantry Division.

The aerospace concern Dassault-Breguet exported a total of 137 aircraft in 1985 including 58 MIRAGE 2000, 24 Mirage F-1s, and 12 ALFA JETs.

Preparations have begun for series production of a new multi-purpose helicopter (SA) developed by Aerospatiale, the 365N PANTERA. In the air mobile transport role, it can carry ten fully equipped troops, and in the fire support configuration, it will be fitted with a variety of weapons including eight HOT anti-tank missiles or MISTRALE air-to-air missiles, attached cannon pods with 20 mm cannon and launchers for 68 and 70 mm ballistic rockets.

A new long range (about 50 km) ASW missile is under development as a replacement for the MALAFON ASW missile system.

ITALY

Sixty-four West German BIBER bridge-laying vehicles, produced under license by OTO Melara, have been delivered to the ground forces. It can span obstacles 20 m wide, has a class 60 payload capacity and requires 5 minutes to lay its bridge over an obstacle. Every armored and mechanized brigade's engineer company will have three such vehicles. The remainder will be used at the division level for engineer duties.

The fifth and sixth SAURO-Class submarines, GIULIANO PRINI and SALVATORE PELOSI are being completed. Their hulls are made of HY 80 steel with an ultimate yield strength of 56 kg/mm^2. It is projected that these submarines will join the fleet in October 1987 and May 1988, respectively.

NORWAY

A contract has been negotiated with STK in the amount of 130 million Norwegian kroner for full-scale development of the TADCOM tactical communication system for the country's ground forces.

GREECE

Appointments for mid-1986:

- Lieutenant General U. Ioannou to command the 1st Army;

- Major General N. Vorvolakas to command the 3rd Army Corps; and

- Major General D. Minikas to command the 4th Army Corps.

TURKEY

The first production model of the SEA GUARD AA gun (overall rate of fire = 3,200 rounds per minute) is being installed aboard the MEKO 200-Class frigate YAVUZ which is nearing completion at a West German shipyard.

NATO

A naval exercise designated NORTHERN WEDDING-86, involving ten NATO countries was conducted from 29 August to 19 September 1986. During these maneuvers, which included the North Atlantic and the Baltic Straits area, the use of strike aviation formations; escorting convoys to reinforce troops ashore; coordination between aircraft; surface ships and submarines, and amphibious assault operations, was developed. Over 150 surface ships and submarines took part in the exercise. The practice amphibious landing was conducted on the northern coast of Norway and on the Jutland peninsula of Denmark.

Joint production of the Italian A-129 MANGUSTA combat helicopter is being considered by Great Britain, Italy, the Netherlands, and Spain. Over 300 aircraft are planned to be produced of which Great Britain would receive 125, Italy 95, and the Netherlands 56.

British Aerospace and OTO Melara are jointly developing a 76 mm guided projectile for use by naval guns against airborne targets.

SWEDEN

The Defense Ministry budget for the 1986/87 fiscal year (which begins June 1st) in the amount of 23.268 billion Swedish kronor, 1.283 billion more than last year, was brought up for discussion before the Reichstag (parliament). Of that total, it proposed that 8.344 billion kronor will go to maintain and equip the ground forces, 7.785 billion will go to the air force, and 3.420 billion will go to the navy.

The ELMA system, which is composed of four launchers designed to shoot small ASW charges (ten on each launcher), is being fitted aboard naval corvettes.

ISRAEL

Arms exports in 1985 accounted for 1.25 billion dolars or one quarter of all industrial exports. Over 100 armament firms, which collectively employ 50,000 workers, sold a wide assortment of "death instruments" overseas, including some of the newest weapon systems. A significant portion of these Isreali weapons are sent to reactionary regimes such as those in the UAR and Chile.

The Taas weapons manufacturing company, which produces the UZI submachine gun and various types of ammunition, exports 70 percent of its output to other countries. The Isreali aircraft manufacturing works that produces the KFIR fighter-bomber and other aircraft sends over 60 percent of its production output overseas.

Fourteen VULCAN/PHALANX Close-in Weapon Systems were ordered for guided missile boats.

PAKISTAN

About 80 per cent of Pakistan's armed forces are deployed along her eastern border with India.

Pakistan's military expenditures have grown by a factor of 200 since 1948. In fiscal year 1985/86 they amounted to 3.2 billion dollars (excluding U.S. military aid, which, from 1981 to 1993, will exceed 7.2 billion dollars). Including the appropriations for military items by other ministeries and corporations, Pakistan's military outlays exceed 5 billion dollars.

JAPAN

There are plans to modernize all 69 F-1 fighter-bombers which equip the 3rd and 8th Aviation Wings. These efforts will extend their operational life span by 3,500 to 4,500 hours as well as incorporate more modern instruments and weapons. In addition, they plan to replace the front canopy glass with a stronger type that can withstand mid-air collisions with birds at speeds over 920 km/h.

There are plans to begin development of an anti-ship missile for surface ships and P-3 ORION ASW aircraft. It will be based on the XSSM-1 shore-to-surface coastal defense missile.

AUSTRALIA

The American-made AN/TPQ-36 radar, which is designed to detect the firing positions of mortars, is entering service with the ground forces.

Plans have been made to equip the naval base at Sterling on Garden Island (a province in Western Australia) to accomodate/handle new submarines. This is in accordance with the concept to exert a naval presence in two oceans. At the present time, the base has material and technical facilities to support surface ships.

NEW ZEALAND

The country's companies have, for all intents and purposes, been barred from participating in the Australian navy's construction program for new submarines. An embargo on American military technology has been imposed on New Zealand firms by the U.S. State Department in connection with the New Zealand government's refusal to permit port calls by American nuclear powered and nuclear armed warships.

SOUTH KOREA

Deliveries of the new American F-16 FIGHTING FALCON fighter have begun to reach the South Korean Air Force. Once in service with the air force, the first of these, the two seat F-16D combat trainer, will be used to train pilots to fly the single seat tactical version, the F-16C.

INDONESIA

The ground forces (210,000 troops) consist of 3 commands: the regular forces (one armored, 13 infantry and 2 airborne brigades), the strategic reserve (1 armored, 3 infantry and 2 airborne brigades), and the special forces (4 diversionary-intelligence groups). They are equipped with 130 AMX-13 light tanks, over 500 armored personnel carriers and armored cars, and about 1,500 field and anti-aircraft artillery pieces and mortars.

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